



UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

2012

FAKULTEIT **NATUURWETENSAPPE** JAARVERSLAG
FACULTY OF **SCIENCE** ANNUAL REPORT



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Voorbladfoto

'Quiver trees by night 2' deur Prof Florian Breuer

Hierdie panoramiese en surrealistiese foto van kokerbome en die Melkweg het in April 2013 die kortlys gehaal in die oop kategorie van die Wêreldfotografie-toekennings. Met meer as 122 000 inskrywings vanuit 170 lande, word die wedstryd gereken as een van die wêreld se voorste fotografie-toekenningsprogramme.

Cover photo

'Quiver trees by night 2', courtesy of Prof Florian Breuer

In April 2013, this panoramic and surrealistic picture of quiver trees and the Milky Way was shortlisted in the open category for the World Photography Awards. With over 122 000 entries from 170 countries, the competition is regarded as one of the world's leading global photographic awards programmes.

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Verslag uit die **Dekaan se kantoor**

As ons terugkyk op 2012 is daar baie om op trots te wees: ons vakkundigheid en vaardighede is uitgebrei met verskeie uitstekende personeelaanstellings; die getal publikasies wat subsidies verdien het, het 'n nuwe rekordhoogte bereik, en so ook die getal wetenskaplikes wat deur die Nasionale Navorsingstigting geëvalueer is.

Verskeie van ons wetenskaplikes het nasionale en internasionale erkenning vir hul werk ontvang en ons akademiese departemente het die hoogste getal doktorsale graduandi in ons geskiedenis opgelewer.

Die fakulteit het, gemeet aan sy wetenskapsuitsette, volgens die Quacquarelli Symonds (QS) World University Rankings van die 331ste plek in 2001, opgeskuif na die 288ste plek in 2012. Dit is in ooreenstemming met die universiteit se visie dat die US 'n navorsingsgedrewe instelling van uitnemendheid moet wees en terselfdertyd ook 'n gerespekteerde kennisvennoot in Suid-Afrika, Afrika en die wêreld. Die getal akademici wat deur die Nasionale Navorsingstigting (NNS) geëvalueer is, het van 84 in 2009 tot 100 in 2012 gegroei.

Twee bykomende SARChI-leerstoele is aan die fakulteit toegeken, sowel as een wat met die Universiteit van Venda gedeel word. Prof Jacky Snoep is die leerstoelhouer in Meganistiese Modelling van Gesondheid en Epidemiologie. Hierdie leerstoel is gekoppel aan die Suid-Afrikaanse Sentrum vir Epidemiologiese Modelling en Analise (SACEMA). Die nuwe SARChI-leerstoel in Wiskundige en Teoretiese Fisiese Biowetenskappe word gedeel met die Afrika-instituut vir Wiskundige Wetenskappe (AIMS) en sal binnekort gevul word.

Verskeie van ons wetenskaplikes het nasionale en internasionale erkenning ontvang. Dit sluit in prof Leon Dicks, wat 'n toekenning van die Nasionale Wetenskap- en Tegnologieforum (NSTF) ontvang het; prof Dave Richardson, wat die John FW Herschel-medalje van die Koninklike Vereniging van Suid-Afrika ontvang het; en prof Jannie Hofmeyr, wat 'n genootskap van die Berlynse Instituut vir Gevorderde Navorsing ontvang het. Prof Liz Bressan is aangestel as lid van 'n kommissie van die Verenigde Nasies se Opvoedkundige, Wetenskaplike en Kulturele Organisasie (UNESCO) en prof Kathy Myburgh is genooi om deel te wees van die paneel deskundiges van die Gatorade Sportwetenskapinstituut in Amerika.

Gedurende 2012 het verskeie personeellede lidmaatskap ontvang van die Suid-Afrikaanse Wetenskapakademie: hulle is prof Michael Cherry van die Departement Plant- en Dierkunde; prof Alf Botha van die Departement Mikrobiologie; en prof Klaus Koch, uitvoerende hoof van die Departement Chemie en Polimeerwetenskap. Prof Eric Strauss van die Departement Biochemie het lidmaatskap van die Suid-Afrikaanse Akademie vir Jong Wetenskaplikes (SAYAS) ontvang.

Ons voormalige dekaan, prof Eugene Cloete, is nou 'n genoot van die Koninklike Vereniging van Suid-Afrika. Hy is ook aangestel as die Universiteit Stellenbosch se nuwe Viserektor: Navorsing en Innovasie met ingang September 2012. Ons wil graag van hierdie geleentheid gebruik maak om prof Cloete te bedank vir die uitsonderlike energie, kreatiwiteit en passie waarmee hy die fakulteit vanaf 2009 tot Augustus 2012 bestuur het.

Teen die einde van 2012 het die fakulteit 'n Natuurwetenskappe Onderrig en Leer-besprekingsforum gestig onder leiding van prof Ingrid Rewitzky, Visedekaan: Onderrig, saam met dr Hanelie Adendorff van die Sentrum vir Onderrig en Leer en dr Margaret Blackie van die Departement Chemie en Polimeerwetenskap. Die doel van die forum is om die onderrig- en leerfunksie in die fakulteit te ondersteun, sowel as om navorsing oor hierdie onderwerp aan te moedig.

'n Meer interaktiewe benadering tot onderrig in lesings en tutoriale vir sommige modules het bygedra tot 'n leerervaring vir studente wat meer aktiewe

Verskeie van ons wetenskaplikes het nasionale en internasionale erkenning vir hul werk ontvang en ons akademiese departemente het die hoogste getal doktorsale graduandi in ons geskiedenis opgelewer.

betrokkenheid van hulle vereis. Alhoewel die impak van hierdie benadering nog nie ten volle meetbaar is nie, het dit beter en meer langdurige begrip ten doel. Ten einde soortgelyke inisiatiewe aan te moedig, het die fakulteit Onderrigontwikkelingsfondse van die Departement van Hoër Onderwys bekom. Hierdie geld sal gebruik word vir projekte om voorgraadse studente se slaagsyfer te verbeter en om terselfdertyd die interaktiewe onderrigvaardighede van dosente te verbeter.

Ná 'n kritiese hersiening van al die programme se finalejaarkurrikulum, is twee hoofvakke vir finalejaars in die meeste van die programme heringestel. Hierdie programverandering stel die fakulteit in staat om studente met diepgaande kennis toe te rus vir nagraadse studies en hulle twee moontlike opsies vir honneurstudies te bied.

Die Fakulteit Natuurwetenskappe het in 2012 soos die res van die universiteit 'n afname in nuwe studente-inskrywings ervaar. Dit lyk egter of dit net 'n tydelike probleem was. Ons is egter besorg oor die klein afname in die diversiteit van ons voorgraadse studente-inname. 'n Ondersoek na moontlike redes hiervoor het getoon dat gebrekkige finansies die belangrikste rede vir lae registrasiegetalle was. Die fakulteit het derhalwe die getal werwingsbeurse van 46 in 2012 na 149 in 2013 vermeerder.

Ongeveer 35% van ons nagraadse studente is afkomstig uit benoemde groepe. Die herstel van 'n diverse studentekorps, sowel as groter diversiteit in ons personeelsamestelling, bly belangrike doelwitte vir die toekoms.

Die Fakulteit Natuurwetenskappe se personeel is ons belangrikste bate. Daarom is ons trots op die voortreflike verslae van ons agt akademiese departemente, en blyk dit duidelik dat ons steeds 'n beduidende bydrae lewer tot die welwees en volhoubaarheid van die universiteit en die Suid-Afrikaanse samelewing oor die algemeen.



Prof Doug Rawlings
Dekaan (waarnemend):
Fakulteit Natuurwetenskappe,
Universiteit Stellenbosch



Prof Terry Robinson
Visedekaan: Navorsing,
Fakulteit Natuurwetenskappe,
Universiteit Stellenbosch



Prof Ingrid Rewitzky
Visedekaan: Onderrig,
Fakulteit Natuurwetenskappe,
Universiteit Stellenbosch

Report from the **Dean's office**

There are many things to be proud of for 2012: we expanded our expertise and skills base with some excellent appointments; the number of subsidy earning publications reached a new record, as did the number of our NRF-rated scientists.

Several of our scientists have received national and international recognition for their work and our academic departments delivered the highest number of PhD graduates in our history.

Based on its scientific outputs, the faculty moved from position 331 in 2011 to 288 in 2012 in the Quacquarelli Symonds (QS) World University Rankings of faculties in the natural sciences. This is in line with the university's vision to be a research-led academic institution of excellence and a respected knowledge partner in South Africa, Africa and the world. The number of academics who have been rated by the National Research Foundation (NRF) increased from 84 in 2009 to 100 in 2012.

The faculty was awarded two additional SARChI chairs, as well as one shared with the University of Venda. Prof Jacky Snoep was awarded the research chair in Mechanistic Modelling of Health and Epidemiology which is linked to the South African Centre for Epidemiological Modelling and Analysis (SACEMA). The new SARChI chair in Mathematical and Theoretical Physical Biosciences, which the faculty shares with the African Institute for Mathematical Sciences (AIMS), is in the process of being filled.

Many of our scientists received national and international recognition. This includes Prof Leon Dicks, who received an award from the National Science and Technology Forum; Prof Dave Richardson, who was awarded the John FW Herschel Medal of the Royal Society of South Africa; and Prof Jannie Hofmeyr, who received a fellowship at the Berlin Institute for Advanced Study. Prof Liz Bressan was appointed as a member of a commission of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and Prof Kathy Myburgh was invited to partake in the expert panel of the Gatorade Sport Science Institute in America.

During 2012 several of our staff members were accepted as members of the Academy of Science of South Africa: they are Prof Michael Cherry from the Department of Botany and Zoology, Prof Alf Botha from the Department of Microbiology and Prof Klaus Koch, executive head of the Department of Chemistry and Polymer Science. Prof Eric Strauss, from the Department of Biochemistry, became a member of the South African Young Academy of Science.

Our former dean, Prof Eugene Cloete, was made a Fellow of the Royal Society of South Africa, and appointed as Stellenbosch University's new Vice-rector: Research and Innovation, from September 2012. We would like to make use of this opportunity to thank Prof Cloete, who was dean from 2009 until August 2012, for the exceptional energy, creativity and passion with which he managed this faculty.

At the end of 2012 the faculty established a Science Teaching and Learning Discussion Forum under the guidance of Prof Ingrid Rewitzky, Vice-Dean: Teaching, together with Dr Hanelie Adendorff from the Centre for Teaching and Learning and Dr Margaret Blackie from the Department of Chemistry and Polymer Science. The aim of the forum is to support the teaching and learning function in the faculty, as well as promoting research on this topic.

“
**Several of our scientists
 have received national and
 international recognition for
 their work and our academic
 departments delivered the
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 graduates in our history.**”

Interactive teaching approaches in lectures and tutorials for some modules have contributed towards a more active and engaging learning experience for students. Although the impact of this approach is not fully measurable yet, it is creating an opportunity for deeper and enduring understanding. As a step towards encouraging more such initiatives, the faculty successfully secured Teaching Development Grants from the Department of Higher Education with the aim of improving the pass rate of undergraduate students, while also developing the interactive teaching skills of lecturers.

After a critical review of the undergraduate final year curricula of all programmes, a double major was reinstated in most of the programmes. This programme renewal enables the faculty to equip students with more in-depth knowledge for postgraduate studies and allows them two possible options for honours studies.

Like the university as a whole, the Faculty of Science recorded a decrease in new student enrolment in 2012. Fortunately, the latter concern appears to be temporary. However, we are concerned about the small decrease in the diversity of our undergraduate student intake. An investigation into the reasons suggested that a lack of finance was the single most important contributor to low registration. The number of recruitment bursary offers from the faculty was therefore increased from 46 in 2012 to 149 in 2013.

Approximately 35% of our postgraduate students are from designated groups. The recovery of student diversity on all levels, and an increase in staff diversity, remains a major focus for the future.

The Faculty of Science values its people as its most important asset. We are proud of the excellent reports of our eight academic departments, and it is evident that the faculty continues to be a major contributor to the wellbeing and sustainability of this university and South African society in general.



Prof Doug Rawlings

Dean (acting):
 Faculty of Science,
 Stellenbosch University



Prof Terry Robinson

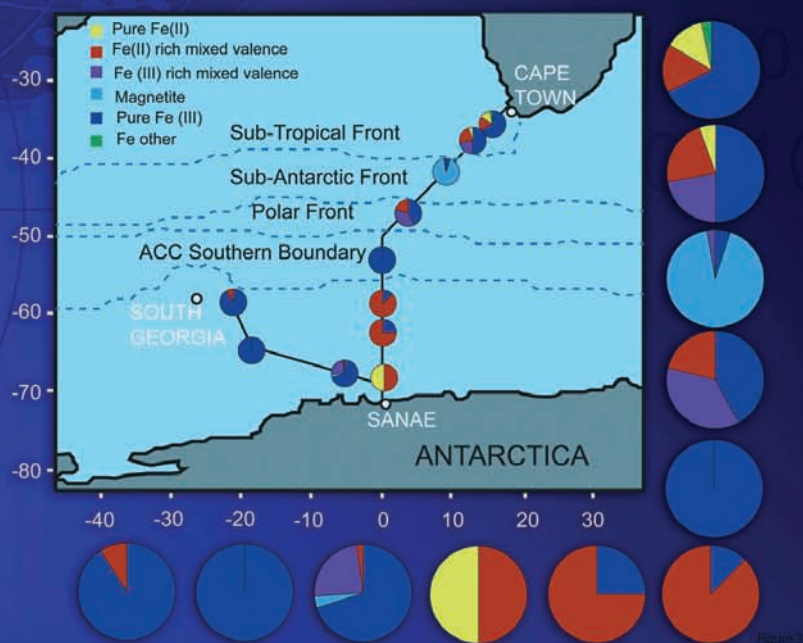
Vice-Dean: Research,
 Faculty of Science,
 Stellenbosch University



Prof Ingrid Rewitzky

Vice-Dean: Teaching,
 Faculty of Science,
 Stellenbosch University

Departement Aardwetenskappe



Navorsers bestudeer die chemiese en minerale samestelling van ysterpartikels in die osean tussen Kaapstad en Antarktika. Hierdie navorsing dra by tot beter begrip van hoe spoorvoedingstowwe die produktiwiteit van oseane beïnvloed en sodoende die globale koolstofkringloop, die aansuring van die oseane en klimaatsverandering raak. Die kaart en sirkeldiagramme hierbo beskryf die relatiewe verspreiding van ysterspesies volgens hul spektrale eienskappe. Die navorsingsbevindings is gepubliseer in *Science*, 'n toonaangewende internasionale vaktydskrif.

Departement **Aardwetenskappe**

Navorsingsbelange

Tektoniek en orogeniese prosesse; sedimentologie van die Karoo-kom; petroleumgeologie; petrogenese van granitiese gesteentes; metamorfe petrologie; spoorelement- en isotopiese geochemie; eksperimentele petrologie; skuifskurdraende goudafsettings; massiewe sulfiedafsettings; swaarmineraal-plaserafsettings; metaalgenese van mobiele stroke; omgewings-, water- en grondgeochemie.

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	19
Boeke	1
Konferensieverrigtinge	1
Redaksionele aktiwiteite (boeke en vaktydskrifte)	4
MSc-studente in 2012 gegradueer	8
PhD-studente in 2012 gegradueer	5

Navorsingshoogtepunte

Prof Gary Stevens se leerstoel binne die Suid-Afrikaanse Navorsingsleerstoelinisiatief (SARChI) is hernu en is tot 'n Vlak I-leerstoel met verhoogde befondsing opgegradeer. Sy NNS-navorsingsgradering is ook verhoog. Verder het hy 'n programrede getiteld "From Anatexis to Granite: an Examination of How Melt Chemistry and Peritectic Assemblage Entrainment Shape Granite Compositions" by die 34ste Internasionale Geologiese Kongres in Australië gelewer.

Prof Abraham Rozendaal het in November as voorsitter by die Raad vir Geowetenskap se Namakwa-landinisiatief-werkswinkel opgetree, waar hy ook 'n lesing gegee het.

Prof Alex Kisters se NNS-gradering is opgegradeer en hy het beduidende befondsing vir 'n omvangryke navorsingsprojek van drie jaar met AngloGold Ashanti in Tanzanië bekom.

Prof Ian Buick het as Spesiale Besoekende Navorser drie jaar se befondsing as deel van die Brazilian Science Without Borders-program verkry.

Die PhD-student Bjorn von der Heyden, sy promotor prof Alakendra Roychoudhury, en 'n aantal ander bydraers het gesamentlik 'n hoëprofielreferaat in die tydskrif *Science* gepubliseer. Die titel van die referaat is: "Chemically and Geographically Distinct Solid-Phase Iron Pools in the Southern Ocean".

Kontakinligting

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E-pos roy@sun.ac.za

Web www.sun.ac.za/earthSci

Akademie sake

Die honneurskohort vir 2012 behels 'n rekordgetal van 34 studente en dui die jaartot-jaar-styging aan wat ons sedert 2007 kon volhou, toe ons die helfte van die getal gehad het. Gegewe die aard van ons projekgedrewe honneursprogram, word dit moeiliker om groter getalle te hanteer. Dit het egter geen impak op die departement se vermoë om leiding aan MSc- en PhD-studente te gee nie, aangesien hulle uit eksterne bronne, sowel as uit die beste kandidate onder ons honneursgegradueerdes gewerf word.

Die departement het as gasheer vir 18 MSc- en 7 PhD-studente opgetree, 'n beduidende kohort gewee ons personeelsterkte.

Diens aan die wetenskaplike gemeenskap

Prof John Clemens is die voorsitter van die Aardwetenskappegraderingspaneel van die Nasionale Navorsingstigting (NNS). Hy is die stigterpresident van die Stolling- en Metamorfe-studiegroep (geaffilieer by die Geologiese Vereniging van SA) en 'n lid van die PostNOMAD-boorprogram se reëlingskomitee.

Prof Alakendra Roychoudhury is 'n mederedakteur van die internasionale tydskrif *Applied Geochemistry*, 'n raadslid van die Internasionale Vereniging van Geochemie (IAGC), 'n lid van die Meriete-toekenningskomitee van die IAGC en die Geochemiese Vereniging, en 'n stigterslid van die Afrika-aardwaarnemingsnetwerk (AEON). Daarbenewens is hy 'n raadslid van die Mariene Navorsingsinstituut (MARE) aan die Universiteit van Kaapstad, 'n reëlingskomiteelid van die NNS Sentrum van Uitnemendheid vir Klimaat- en Aardsisteemwetenskap (ACCESS) en die Internasionale Geotraces-program, asook 'n lid van die Nasionale Oseanografiese toerusting- en beplanningskomitee.

Prof Gary Stevens is 'n komiteelid van die Wes-Kaapse streeksprogram vir die aankoop van duur toerusting (REEP). Hy lewer 'n belangrike bydrae in sy posisie as direkteur van die Sentrale Analitiese Fasiliteit (SAF) aan die Universiteit Stellenbosch, en as bekleër van die SARChI-leerstool in Eksperimentele Petrologie in die Departement Aardwetenskappe, wat deur die Suid-Afrikaanse Navorsingsleerstoolinisiatief (SARChI) ondersteun word. Hy is 'n lid van die redaksionele rade van *Lithos*, *Terra Nova* en die *Journal of Metamorphic Geology*.

Prof Alex Kisters dien op die redaksionele raad van die *South African Journal of Geology* en is 'n paneellid van die NNS se nasionale Antarktiese program, SANAP.

Prof Ian Buick is 'n lid van die redaksionele rade van *Lithos* en *Gondwana Research*.

Dr Jodie Miller is die voorsitter van die Wes-Kaapse tak van die Geologiese Vereniging van Suid-Afrika (GSSA).

Prof Dirk Frei is 'n permanente lid van die Europese Wetenskapstigting se groep beoordelaars van navorsingsvoorstelle.

Die akademiese personeel in die departement dien gereeld as beoordelaars van wetenskaplike referate, navorsingsvoorstelle en graderingsaansoeke (nasionaal en internasionaal). Hulle tree ook as eksterne eksaminatore vir MSc- en PhD-kandidate op.

Toekennings aan personeel en studente

Me Taryn-Kim Rudnick het die Geologiese Vereniging van Suid-Afrika se Haughtonprys vir die beste BSc-honneurstesis in die aardwetenskappe aan 'n Suid-Afrikaanse universiteit ontvang. Haar tesis handel oor aspekte rakende die oorsprong van die Swartberg-Cu-Pb-Zn-Ag-afsettings in die noordweste van Suid-Afrika.

Personeelsake

Dr Catherine Clarke (omgewings- en grondgeochemie) het as dosent van die Departement Aardwetenskappe na Grondwetenskap oorgeskuif. Haar plaasvervanger, dr Susanne Fietz, het op 1 Januarie 2013 haar pos aanvaar.

Prof Axel Gerdes van die Goethe Universiteit (Duitsland) is gedurende 2012 as buitengewone professor aangestel.

Prof Gerdes is 'n vermaarde navorser in geochemie en isotopiese geowetenskap.

Samewerking

SUID-AFRIKA

Landbou Navorsingsraad, Nietvoorbij
iThemba Labs

Raad op Geowetenskappe
Rhodes Universiteit

Suid-Afrikaanse Kernenergiekorporasie (NECSA)

Universiteit van Kaapstad

Universiteit van Pretoria

Universiteit van die Wes-Kaap

Universiteit van die Witwatersrand

Wetenskaplike en Nywerheidsnavorsingsraad

AFRIKA

Geologiese Opname van Namibië
Universiteit van Namibië

INTERNASIONAAL

Algemeen

Geotraces Internasionaal (Australië, Verenigde Koninkryk, VSA)

Australië

Australiese Nasionale Universiteit
Curtin Universiteit van Tegnologie
James Cook Universiteit
Museum Victoria
Universiteit van Adelaide
Universiteit van Monash

Brasilië

Federale Universiteit van Ouro Preto

China

Chinese Universiteit van Geowetenskappe, Wuhan

Denemarke

Geologiese Opname van Denemarke en Groenland

Duitsland

Aachen Universiteit van Tegnologie
Freiburg Universiteit
Memorial Universiteit
Universiteit van Hamburg

Finland

Universiteit van Helsinki

Frankryk

Universiteit van Blaise-Pascal, Clermont-Ferrand
Universiteit van Brest
Universiteit van Parys VII
Universiteit van Rennes
Universiteit van St Etienne

Ierland

Universiteitskollege van Dublin

Indië

Indiese Instituut van Tegnologie-Kharagpur
Universiteit van Rajasthan

Italië

Universiteit van Padova

Japan

Shizuoka Universiteit

Kanada

McGill Universiteit
Universiteit van Ottawa

Nederland

Delft Universiteit van Tegnologie
Rijksuniversiteit Groningen
Universiteit van Utrecht

Spanje

Universiteit van Grenada

Swede

Linköping Universiteit

Switserland

Universiteit van Lausanne

Foto: Engela Duvenage



Mnr Bjorn von der Heyden en sy studieleier, prof Alakendra Roychoudhury.

Doktorale student publiseer in Science

'n Doktorale student in Aardwetenskappe het geskiedenis gemaak toe hy die eerste doktorale student in die fakulteit geword het om 'n artikel in die toonaangewende internasionale vaktydskrif Science te publiseer.

Die artikel, deur **mnr Bjorn von der Heyden** en sy studieleier, **Prof Alakendra Roychoudhury** van die Departement Aardwetenskappe, is in November 2012 gepubliseer in samewerking met Princeton Universiteit en die Wetenskaplike en Nywerheidsnavorsingsraad.

Die studie – van ysterpartikels in die seewater tussen Kaapstad en Antarktika – is die eerste van sy soort en die monsters is tydens drie navorsingsreise oor die Suidelike Yssee ingesamel. Die navorsers het die chemiese en minerale samestelling van die partikels in die oppervlakwatermonsters geanaliseer en vyf verskillende soorte ysterpartikels geïdentifiseer.

Die bevindinge dra by tot beter begrip van hoe spoorvoedingstowwe die produktiwiteit van oseane beïnvloed en sodoende die globale koolstofkringloop, die aansuring van die oseane en klimaatsverandering raak.

Mnr Von der Heyden het 'n nuwe tegniek ontwikkel om die chemie van die ysterpartikels te verstaan en het 'n X-straalgebaseerde metode gebruik om nanogrootte ysterpartikels in seewater op te spoor, te ontleed en te karteer. Hiervoor moes hy siklotron-toerusting by die Lawrence Berkeley nasionale laboratorium gebruik, aangesien soortgelyke partikelversnellers nog nêrens in Afrika beskikbaar is nie.

Verenigde Koninkryk

Leeds Universiteit
Liverpool Universiteit
Universiteit van Durham
Universiteit van Edinburgh
Universiteit van Newcastle

Verenigde State van Amerika

Colorado Skool van Mynbou
Lehigh Universiteit
Princeton Universiteit
Woods Hole Oseanografiese Instituut

Befondsing

Anglo Base Metals
AngloGold
AngloGold Ashanti
AngloPlatinum
Australiese Navorsingsraad
BHP Billiton
Chevron Texaco
ConocoPhillips
Europese Unie
ExxonMobil
Geologiese Vereniging van Suid-Afrika
Inkaba ye Africa
Kumba Hulpbronne
Namaqua Sands
Nasionale Navorsingstigting
Regering van Gaboen
Schlumberger
StatoilHydro
TransHex
Waternavorsingskommissie
Wetenskaplike en Nywerheidsnavorsingsraad

Personeel

Doserend

Prof JD Clemens
Prof IS Buick
Dr R Heyn
Prof A Kisters
Dr M Klausen
Dr D Mikes
Dr J Miller
Prof A Roychoudhury (departementshoof sedert Oktober 2012)
Prof A Rozendaal
Prof G Stevens

Buitengewone professore

Prof A Gerdes
Prof N Phillips
Prof W Verwoerd

Buitengewone medeprofessor

Prof D Frei

Buitengewone senior lektor

Dr I Basson

Ondersteuningspersoneel

L Conradie
G Olivier
F Timmey

Navorsers met NNS-graderings

Internasionaal erkende navorser

Prof John Clemens
(stollings- en eksperimentele petrologie)
Prof Ian Buick
(metamorfe petrologie, geochemie en isotopiese geochemie)
Prof Gary Stevens
(SARCh-leerstoel in eksperimentele petrologie)
Prof Alex Kisters
(strukturele geologie en tektoniek)

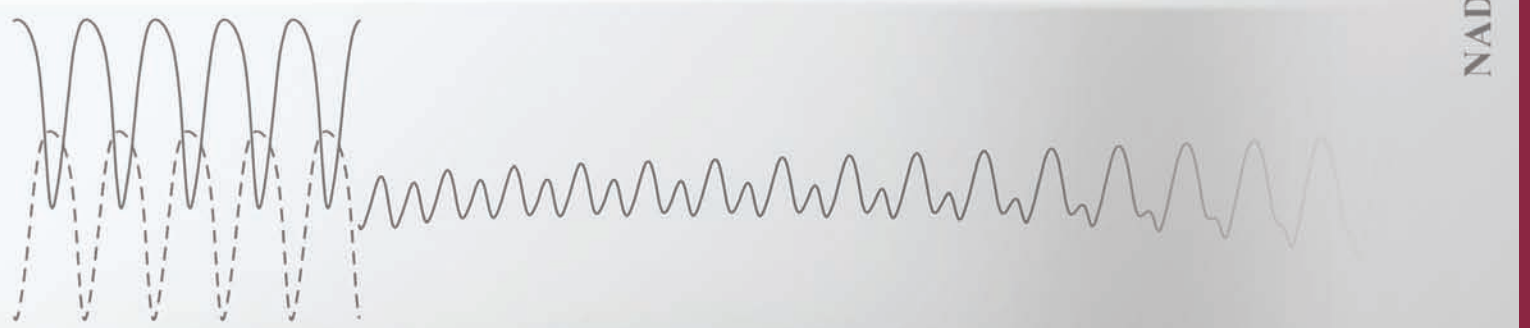
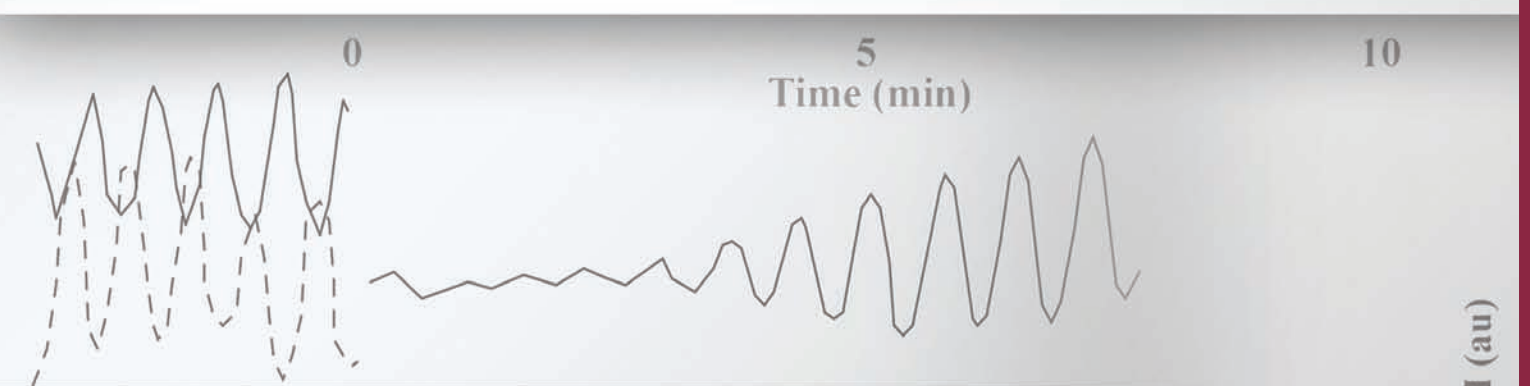
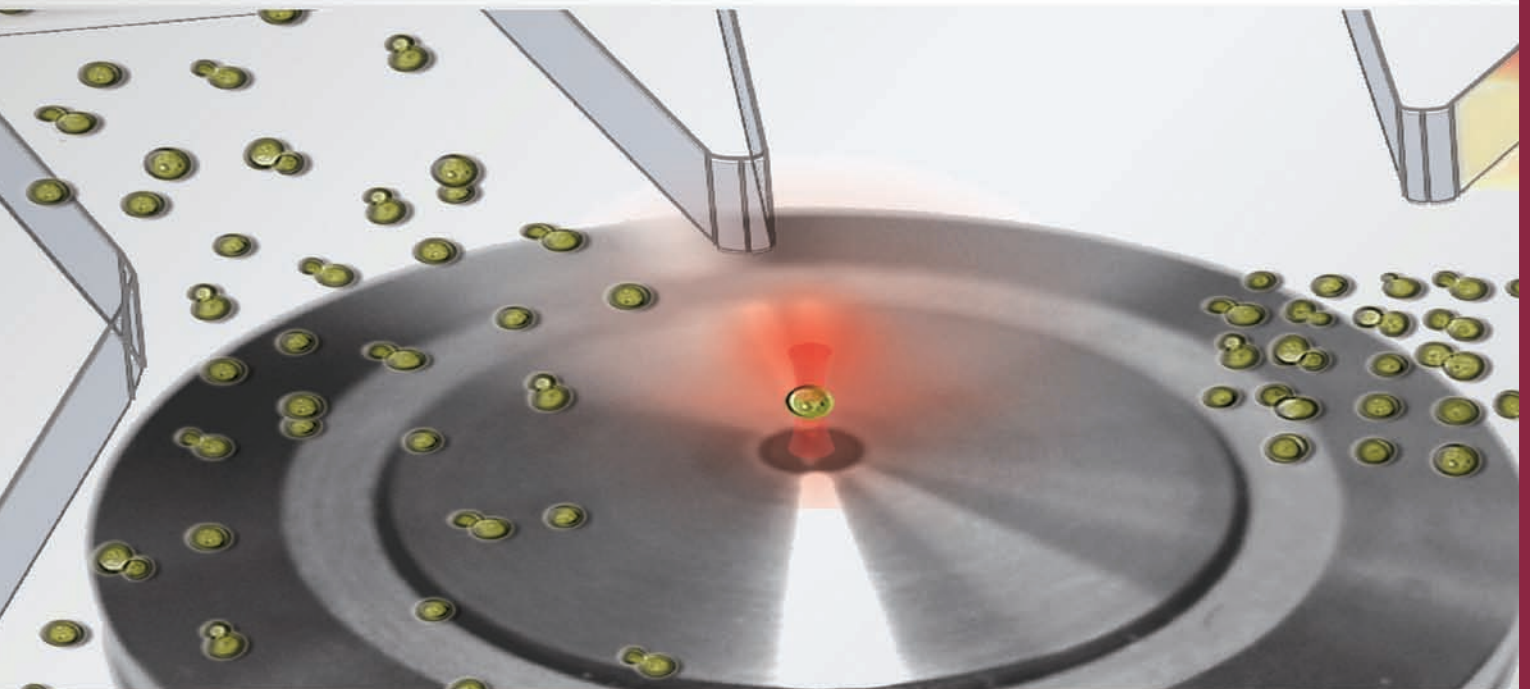
Gevestigde navorser

Prof Alakendra Roychoudhury
(omgewingsgeochemie en hidrologie)

Wetenskaplikes bestudeer die beheer en regulasie van sellulêre prosesse deur middel van teorie, rekenaarmodellering en eksperimentele benaderings. In hierdie voorbeeld (onderstaande grafiek) het hulle 'n gedetailleerde wiskundige model vir glikolitiese ossilasies van gis geskonstrueer; ten einde die sinkronisasie van ongelykfasige gispopulasies in meng-eksperimente te bestudeer. Dieselfde model is daarna gebruik om die eksperimentele voorwaardes vir metaboliese ossilasies in geïsoleerde gisselle te bepaal. In samewerking met navorsers van die Universiteit van Gothenburg was hulle die eerste om standhoudende glikolitiese ossilasies in geïsoleerde gisselle te kan waarneem. 'n Optiese pinset is gebruik om selle te posisioneer en 'n mikrofluidiese kamer om omgewingsbeheer toe te pas (sien kunstenaarsvoorstelling).

Grafiese voorstelling: Prof Jacky Snoep

Departement **Biochemie**



Departement **Biochemie**

Navorsingsbelange

Aanwending van bio-aktiewe peptiede in landbou, aartappelvirus sistematiek en deteksie; antibiotika en membraan aktiewe peptiede; biowerking van rooibos en *Sutherlandia frutescens*; ensiem-inhibitor-ontwikkeling; malariametabolisme en antimalariamiddelnavorsing; molekuleêre plantsistematiek; meganistiese ensimologie; membraan-affiniteitsuiwering; natuurprodukte; rekenaarmatige en eksperimentele sisteembioologie; steroïedhormoon-biosintese en metabolisme in die bynier en prostaat, steroïed-reseptore en steroïedbindende proteïene; volstruispatologie en -entstofontwikkeling.

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	31
Redaksionele aktiwiteite (boeke en vaktydskrifte)	6
Boeke, konferensieverrigtinge, hoofstukke in boeke	3
MSc-studente in 2012 gegradueer	9
PhD-studente in 2012 gegradueer	5

Navorsingshoogtepunte

Die Departement Biochemie is goed verteenwoordig by die 23ste Kongres van die Suid-Afrikaanse Vereniging vir Biochemie en Molekulêre Biologie wat in Januarie 2012 in die Drakensberge gehou is, in samewerking met die Federasie van Verenigings vir Biochemie en Molekulêre Biologie in Afrika. Prof Erick Strauss het die Beckman Coulter/SASBMB silwermedalje-lesing aangebied, as die 2010-ontvanger van hierdie toekenning. Prof Ann Louw en vyf van haar studente het twee referate en drie plakkaatvoordragte gelewer. Prof Marina Rautenbach en ses van haar studente het twee referate en vyf plakkaatvoordragte gelewer.

Dr Donita Africander het die Cold Spring Harbor Laboratory se vergadering oor Kernreseptore en Siektes in New York (VSA) bygewoon en 'n plakkaatvoordrag oor haar navorsing aangebied. Prof Dirk Bellstedt en een van sy studente het twee lesings gegee by die 5de PVYWide Organization Meeting in Edinburgh (Skotland) en ook besoek afgelê by die Edinburgse Koninklike Botaniese Tuine.

Prof Ann Louw het in Oktober 2012 'n gaslesing gegee by 'n simposium oor die bioaktiewe beginsels van medisinale plante en dieet wat by die Technische Universität Dresden (Duitsland) gehou is. Sy het 'n plakkaat voorgedra by die gesamentlike kongres wat in September 2012 in Seville (Spanje) gehou is deur die Federasie van Europese Verenigings

vir Biochemie (FEBS) en die Internasionale Unie vir Biochemie en Molekulêre Biologie (IUBMB).

Prof Marina Rautenbach was gedurende Julie 2012 'n besoekende wetenskaplike by die Leipzig Instituut vir Molekulêre Farmakologie in Berlyn (Duitsland). Sy het ook drie plakkaatvoordragte by die 3de Internasionale Konferensie oor Antimikrobiële Peptiede (AMP2012) te Villeneuve d'AscQ (Frankryk) gelewer. Prof Johann Rohwer het 'n lesing gegee by die 5de jaarlikse kongres oor die programmeringstaal, Python (EuroSciPy 2012), wat in Brussels (België) gehou is.

Prof Jacky Snoep se navorsingsgroep het in samewerking met Sweedse wetenskaplikes drie opeenvolgende artikels oor glikolitiese ossilasies in die *Federation of European Biochemical Societies Journal* (FEBSJ) gepubliseer. Hierdie artikels is ook in die virtuele uitgawe van die vaktydskrif opgeneem as uitstekende voorbeelde van sisteembioologie. Dr Anna-Karin Gustavsson ('n Sweedse wetenskaplike en deel van die groep) het die toekenning vir die beste bydrae deur 'n jong wetenskaplike gekry.

Prof Erick Strauss het in Februarie 2012 'n gaslesing by die konferensie oor Zing Natuurlike Produkte in Lanzarote (Spanje) gegee. Prof Pieter Swart het in Desember 2012 'n hooflesing by die konferensie oor Molekulêre Medisyne 2012 (MMC2012) in Bangkok (Thailand) gegee.

Kontakinligting

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Akademie sake

Die Departement Biochemie is trots op die groot aantal nagraadse studente in sy geledere: in 2012 was daar 20 Honneurs-studente, 34 MSc-studente en 23 PhD-studente.

Diens aan die wetenskaplike gemeenskap

Dr Donita Africander het as tesourier van die Suid-Afrikaanse Vereniging vir Biochemie en Molekulêre Biologie gedien.

Prof Johann Rohwer was 'n lid van die internasionale kommissie wat standarde vasstel vir die rapportering van ensiemologiese data (STRENDIA). Hy het ook gedien as mederedakteur van *BMC Systems Biology* en is verkies tot die redaksie van *Frontiers in Plant Systems Biology*.

Prof Jacky Snoep was die redakteur van die volgende vaktydskrifte: *Federation of European Biochemical Society Journal* (FEBSJ), *Microbiology*, *IET Systems Biology*, en *Metabolomics*.

Toekennings aan personeel en studente

Twee akademiese personeellede was suksesvol met hulle aansoeke by die NNS vir herevaluering. Prof Jacky Snoep se gradering het van B3 na B2 verbeter en Prof Ann Louw se gradering het van C3 na C2 verbeter.

Dr Karl Storbeck en Me Lindie Schloms het in Junie 2012 toekennings as uitnemende jong navorsers ontvang by die 15de Konferensie oor die Adrenale Korteks in Texas (VSA).

'n SARChI-leerstoel in die meganistiese modellering van gesondheid en epidemiologie is aan Prof Jacky Snoep toegeken. Hy doen navorsing oor 'n meganistiese begrip en wiskundige modellering van die toestand van die geïnfekteerde liggaam tydens malaria en MIV-infeksies, asook oor die ontwikkeling van tipe II-diabetes. Hy sal nou met die Suid-Afrikaanse Sentrum vir Epidemiologiese Modellering en Analise (SACEMA) saamwerk in die modellering van die MIV-epidemiologie.

Personeelsake

Dr Karl Storbeck is aangestel as lektor met ingang 1 Junie 2012. Mnr Charlton Jansen is aangestel as 'n assistent met ingang 1 Julie 2012.

Gemeenskapsinteraksie

Prof Rautenbach het twee praatjies vir Bollandse wynboere aangebied om die rol van Biochemie in die landbou ten toon te stel. Die praatjies het gehandel oor proteïene en aminosure in natuurlike bemestingstowwe. Sy dien ook as konsultant vir maatskappye soos SABMiller, Rhodes Food Group, Diasorin en EcoFert.

Samewerking

SUID-AFRIKA

Aartappels Suid-Afrika
Afdeling vir Na-oes en Wyntegnologie, Landbounavorsingsraad, Infruitec-Nietvoorbij
BBI Enzymes
Diasorin
EcoFert
Elsenburg Landboukollege
Grootfontein Landbou-ontwikkelingsinstituut
Klein-Karoo Groep
Noordwes-Universiteit
Research Solutions
Rhodes Food Group
SABMiller
Suid-Afrikaanse Rooibosraad
SurePure
Sybokhaar Suid-Afrika
Universiteit van die Witwatersrand
Universiteit van KwaZulu-Natal
Departement Biochemie, Universiteit van Pretoria
Departemente van Chemie en Molekulêre en Selbiologie, Universiteit van Kaapstad
Departement van Mediese Biowetenskap, Universiteit van die Wes-Kaap
Instituut van Farmakologie, Universiteit van Kaapstad
Mediese Skool van Biochemie, Genetika en Mikrobiologie, Universiteit KwaZulu-Natal
Skool vir Chemie en Metallurgiese Ingenieurswese, Universiteit van die Witwatersrand
Wetenskaplike en Nywerheidsnavorsingsraad, Biowetenskappe
Eenheid vir Geneesmiddelnavorsing en -ontwikkeling, Noordwes-Universiteit

INTERNASIONAAL

Australië

Australiese Nasionale Universiteit
La Trobe Universiteit

Duitsland

Leibniz Instituut vir Molekulêre Farmakologie
Max Planck Instituut vir Chemiese Ekologie
Max Planck Instituut vir Molekulêre Plantfisiologie

Hongarye

Departement van Anorganiese en Analitiese Chemie, Universiteit van Debrecen

Italië

Italiaanse Nasionale Navorsingsraad (CNR), Instituut vir Proteïen Biochemie

Nederland

Vrije Universiteit van Amsterdam

Spanje

Universitat Autònoma de Barcelona

Sweden

Universiteit van Gothenburg

Switserland

Universiteit van Zürich

Verenigde Koninkryk

Koninklike Botaniese Tuin Edinburgh
Universiteit van Aberdeen
Universiteit van Edinburgh
Universiteit van Manchester

Verenigde State van Amerika

Departement Chemie, University of Wisconsin
Departement Dermatologie en Urologie, Feinberg Skool vir Medisyne, Northwestern Universiteit, Chicago
Departemente Molekulêre en Geïntegreerde Fisiologie en Interne Medisyne, Universiteit van Michigan
Departement Fisiologie, Mediese Kollege van Georgia

Befondsing

Aartappels Suid-Afrika
BBI Enzymes
Bioep navorsingsfonds
Duits/Suid-Afrikaanse Bilaterale Fonds
Ernst Oppenheimer Genootskap Trustfonds
Hongaars/Suid-Afrikaanse Bilaterale Fonds
Kankervereniging van Suid-Afrika
Klein-Karoo Groep
Mediese Navorsingsraad
Nasionale Navorsingstigting
Program vir Tegnologie en Menslike Hulpbronne vir die Nywerheid (THRIP)
Research Solutions
Sybokhaar Suid-Afrika
SAB-Miller
Suid-Afrikaanse Malaria-inisiatief
Suid-Afrikaanse Platform vir Navorsing en Innovasie oor MIV/VIGS
Suid-Afrikaanse Rooibosraad
SurePure
Universiteit Stellenbosch
Waternavorsingskommissie

Biochemikus ontvang verdere befondsing vir rooibosnavorsing

Prof Amanda Swart is een van 'n handjievol Suid-Afrikaanse wetenskaplikes wie se navorsing voordeel trek uit 'n navorsingstoekenning van R2 miljoen van die Suid-Afrikaanse Rooibosraad (SARC).

Prof Swart is 'n biochemikus en medeprofessor aan US se Departement Biochemie. Sy ontvang reeds vir die afgelope vier jaar SARC-befondsing vir haar werk oor rooibostee se unieke vermoë om stresvlakke te verlaag.

Sy het onder meer wetenskaplike bewyse gepubliseer dat rooibostee die produksie van kortisol, die sogenaamde “streshormoon”, verlaag. Kortisol word deur die biniere in die liggaam vervaardig. Alhoewel kortisol deel van die mens se metabolisme uitmaak, kan stresvolle lewenstyle hoë vlakke van die steroïedhormoon tot gevolg hê. Die oorproduksie van kortisol as gevolg van stres kan tot 'n verskeidenheid lewenstelsiesktes lei, waaronder hoë bloeddruk, metaboliese sindroom, hartsiektes, insulienweerstandigheid en tipe 2 diabetes.

Prof Swart se navorsingspan het twee seldsame komponente in rooibos noukeurig aangedui – die twee flavonoïede bekend as aspalatien en notofagien. Hierdie flavonoïede het 'n invloed op die biosintese van kortisol. Aspalatien is nog in geen ander plantmateriaal aangetref nie, terwyl notofagien 'n baie beperkte verspreiding in die natuur het.

Personeel

Doserend

Prof P Swart (departementele voorsitter)
 Dr DJ Africander
 Prof DU Bellstedt
 Dr A Botes
 Prof J-HS Hofmeyr
 Prof A Louw
 Prof M Rautenbach
 Prof JM Rohwer
 Prof JL Snoep
 Dr K Storbeck
 Prof E Strauss
 Prof AC Swart

Buitengewone professore

Prof WCA Gelderblom

Ondersteuningspersoneel

W Maart (sekretaresse)
 AP Arends
 KD Botha
 R Brandt
 CA de Villiers
 L du Toit
 A Februarie
 LL Foster
 GD Gerstner
 CR Jansen
 C Langeveldt
 RP Louw
 Dr MA Stander

Navorsers met NNS-graderings

Toonaangewende internasionale navorser

Prof Jannie Hofmeyr
(sisteembioëologie en kompleksiteitsstudies)

Internasionaal erkende navorser

Prof Johann Rohwer
(sisteembioëologie)

Prof Jacky Snoep
(sisteembioëologie)

Prof Pieter Swart
(adrenale steroïedogenese, affiniteitssuiwering en proteïen immobilisering)

Gevestigde navorser

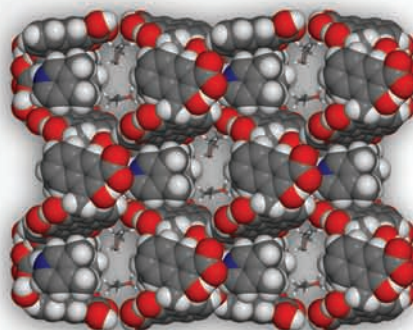
Prof Dirk Bellstedt
(molekulêre plantsistematiek en immunologie)

Prof Ann Louw
(steroïed-reseptore, biowerking van rooibos)

Prof Amanda Swart
(biowerking van rooibos en Sutherlandia frutescens)

Ontvanger van NNS prestige-toekenning

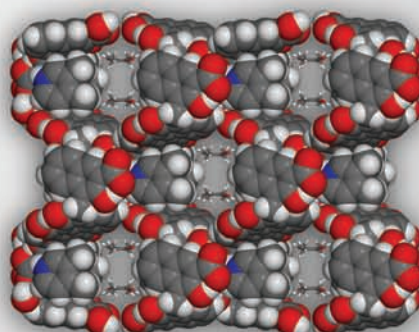
Prof Erick Strauss
(meganistiese ensimologie en inhibitor ontwikkeling)



Departement **Chemie en Polimeerwetenskap**

As ons kan verstaan hoe molekules kristalliseer, kan ons die proses begin beheer en dus materiale met spesifieke eienskappe ontwerp. Wetenskaplikes het onlangs navorsing oor sistematiese analise van die vastetoestand strukture van organiese karboksilaatsoute gedoen. Die studie het bevind dat organiese soute gebruik kan word vir die vorming van poreuse materiale. Een van die materiale (sien grafiese voorstelling) kan die oplosmiddel wat in die kanale in die kristal voorkom, uitruil vir verskeie ander oplosmiddels wanneer dit blootgestel word aan die damp van die tweede oplosmiddel. Dit vind plaas op 'n enkelkristal-tot-enkelkristal-basis. Die integriteit van die kristal word dus behou gedurende die uitruilproses. Hierdie navorsing is gepubliseer in *Chemical Communications* en was in Augustus 2012 een van die toptien mees gelese artikels.

Foto: Dr Delia Haynes



BEGIN



12 URE



24 URE



Departement **Chemie en Polimeerwetenskap**

Navorsingsbelange

Sintetiese metodologie gemik op bruikbare nuwe verbindings en materiale (katalisatore, polimere, ander supramolekulêre netwerke met toepassingspotensiaal, membrane en biologies-aktiewe verbindings); skeidingstegnologie en gevorderde analise (GC-MS, HDVC-MS, GPC, elektroanalise, KMR, polimeerskeidings, atoomkrag-mikroskopie, IGP-MS, CRYSTAF en diffraksietegnologie); chemiese struktuurmodellering; platinum-metaalchemie-navorsing in die konteks van affinerings en suiwerings; medisinale chemie

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	90
Artikels in nie-geakkrediteerde vaktydskrifte	8
Konferensieverrigtinge	2
Hoofstukke in boeke	4
MSc-studente in 2012 gegradueer	18
PhD-studente in 2012 gegradueer	13
DSc-studente in 2012 gegradueer	1

Navorsingshoogtepunte

Die departement was aktief besig met navorsing en het in 2012 'n rekord aantal navorsingspublikasies opgelewer: 82 eweknie-beoordeelde artikels, vier hoofstukke in boeke en tien simposium- en konferensievoordragte is gepubliseer. Daarbenewens is een DSc-, agt PhD- en drie MSc- grade (een *cum laude*) in Desember 2012 toegeken. Addisioneel hiertoe is ook vyf PhD- en tien MSc- grade (een *cum laude*) by die Maart 2013 gradeplegtigheid toegeken. 'n DSc-graad is aan Prof Bert Klumperman toegeken, die enigste een in meer as 'n dekade, dit terwyl hy ook as studieleier vir vier PhD-studente opgetree het.

Die hoë-impak vaktydskrif van die Koninklike Vereniging vir Chemie (RSC), *Chemical Communications*, het 'n artikel getiteld "Interconversion between different stoichiometric forms of a three-component crystal via liquid-assisted grinding" deur Dr Delia Haynes en medewerkers op sy voorblad gedra.

Dr Katharine de Villiers-Chen, dr Tanya Le Roux en PhD-student Kalifi Gil-denhuis het 'n vollengte artikel getiteld "The Single Crystal X-ray Structure of β -Hematin DMSO Solvate Grown in the Presence of Chloroquine, a β -Hematin Growth-Rate Inhibitor" in die *Journal of the American Chemical Society*, die hoogs aangeskrewe vlagskipvaktydskrif van die Amerikaanse Vereniging vir Chemie, gepubliseer.

Die Nasionale Navorsingstigting (NNS) het hoër navorsingsgraderings toegeken aan prof Bert Klumperman (A2) en (Emeritus) prof Helgard Raubenheimer (B1), medeprofessore Catharine Esterhuysen en Albert van Reenen (C2). Dr Stephen Pelly het 'n Y2-gradering ontvang.

Verskeie akademiese navorsers het die departement besoek om saam met ons personeellede te werk en ook seminare aan te bied. Hulle sluit in: prof Ebbe Nordlander, Universiteit van Lund (Swede); dr Alan Kenwright, Durham Universiteit (VK); prof Alan Rowan, Radboud Universiteit (Nederland); prof Tom Simpson, Universiteit van Bristol (VK); prof David Wright, Vanderbilt Universiteit (USA); prof Jonathan Steed, Durham Universiteit (VK); dr Graeme Day, Universiteit van Southampton (VK); prof Kevin Naidoo, Universiteit van Kaapstad (SA); en prof Tadeusz Gorecki, Universiteit van Waterloo (Kanada).

Akademiese personeellede en studente het die departement op verskeie nasionale en internasionale konferensies verteenwoordig. Prof Klaus Koch het 'n hooflesing gegee by die 21ste Sloweense-Kroatische Kristallografie Byeenkoms (Slowenië), 'n gaslesing by die 40ste Internasionale Konferensie oor Koördinasiechemie (ICCC) (Spanje), en was 'n hoofspreker by die Platinum Konferensie: 'n Katalis vir Verandering, wat gereël is deur die Suid-Afrikaanse

Kontakinligting

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Prof Harald Pasch is genooi om hooflesings te gee by die Internasionale Simposium oor Hoëverrigting Vloeistoffase Skeidings (HPLC 2012) (VSA), en by die eerste Werkswinkel oor Makromolekulêre Skeidings-deur-ontwerp (VSA), wat aangebied is deur die Nasionale Instituut vir Standaarde en Tegnologie (NIST). Hy het ook gaslesings gegee by die Gesprekke oor Toegepaste Polimeerchemie (APC), (Duitsland); by ANALYTIX-2012 (China); die Internasionale Unie van Suiwer en Toegepaste Chemie (PAC) se Makro 2012 Polimeer Wêreldkongres (VSA); by die 4de Internasionale Konferensie oor Poliölefin Karakterisering (VSA); en by die Polimeerwetenskap Lesingreeks (China).

Prof Bert Klumperman is genooi om lesings te gee by die 33ste Australiese Polimeer Simposium (Australië), die Makro Groep VK Internasionale Konferensie oor Polimeersintese (VK), en die Nasionale Vergadering van die Amerikaanse Vereniging vir Chemie (VSA).

Prof Selwyn Mapolie het die departement verteenwoordig by die XXVde Internasionale Konferensie oor Organometaalchemie (Portugal); en die 40ste Internasionale Konferensie oor Koördinasiechemie (ICCC) (Spanje). Prof Peter Mallon het die POLYCHAR 20 (Wêreldforum oor Polimere en Gevorderde Materiale) in Kroasië bygewoon. Dr Delia Haynes het op die reëlingskomitee van Indaba 7 (Suid-Afrika) gedien en deelgeneem aan die Gordon Navorsingskonferensie oor Kristalmanipulasie (VSA). Dr Katherine de Villiers-Chen het deelgeneem aan die Gordon Navorsingskonferensie oor die Chemie en Biologie van Tetrapiroole (VSA); en dr Robbie Luckay het die 40ste Internasionale Konferensie oor Koördinasiechemie (ICCC) (Spanje) bygewoon.

Prof André de Villiers was 'n genooide hoofspreker by die 12de Internasionale Simposium oor Gekoppelde Tegnieke in Chromatografie (HTC-12) (België), by Skeidingswetenskap Asië 2012 (Maleisië), en by ChromSAAMS 2012 (Suid-Afrika).

Diens aan die wetenskaplike gemeenskap

Die personeelle van die Departement Chemie en Polimeerwetenskap was betrokke by die aktiwiteite van verskeie nasionale rade en verenigings, in besonder die Suid-Afrikaanse Chemiese Instituut (SACI), die Vereniging van Biologiese Anorganiese Chemie, die Suid-Afrikaanse Kristallografiese Vereniging (SACryst), die Suid-Afrikaanse Akademie vir Wetenskap en die Koninklike Vereniging van Suid Afrika.

Personeelle is ook lede van verskeie internasionale verenigings wat die Koninklike Vereniging vir Chemie (VK), die Amerikaanse Chemiese Vereniging, die Amerikaanse Vereniging vir Kristallografie, die Koninklike Nederlandse Chemiese Vereniging en die Internasionale Vereniging vir Biomediese Polimere en Polimeriese Biomateriale insluit.

Prof Catharine Esterhuysen het in die Suid-Afrikaanse komitee van die Internasionale Unie vir Kristallografie (IUCr) gedien. Sy was ook president van die Suid-Afrikaanse Kristallografiese Vereniging (SACrS).

Prof Peter Mallon was die voorsitter van die Wes-Kaapse tak van SACI en 'n lid van die SACI-raad. Dr Gareth Arnott was 'n raadslid van SACI Wes-Kaap, terwyl Dr Margaret Blackie as tesourier gedien het. Dr Arnott is ook lid van die 2014 Frank Warren reëlingskomitee wat verantwoordelik is vir die volgende Suid-Afrikaanse Kongres oor Organiese Chemie wat elke twee jaar plaasvind.

Prof Klaus Koch en Prof Harald Pasch was deel van die uitvoerende komitee van die Internasionale Konferensie oor Koördinasiechemie.

Prof Mallon dien in die wetenskapkomitee van die Wêreldforum vir Gevorderde Materiale (POLYCHAR) en is die voorsitter van die reëlingskomitee van POLYCHAR 22 wat gedurende April 2014 in Stellenbosch plaasvind.

Prof Bert Klumperman was betrokke by verskeie internasionale komitees. Hy was 'n lid van die Internasionale Unie vir Suiwer en Toegepaste Chemie (IUPAC); 'n lid van die IUPAC-werksgroep oor die kinetika van RAFT-polimerisasie en lid van IUPAC se Internasionale Adviesraad vir die 2012 konferensie in Warwick (VK). Hy dien ook in die Internasionale Advieskomitee vir die IUPAC MACRO 2012 Wêreldkongres oor Polimere in Virginia (VSA); in die Internasionale Advieskomitee vir die Europese Federasie vir Polimeernavorsing se 2013-kongres

in Italië, en die Wetenskap-adviesraad vir die internasionale kongres oor Industriële Biotegnologie (IBIO) wat gedurende 2013 in Nanjing (China) plaasvind.

Prof Mallon was lid van die Nasionale Navorsingstigting se keuringspaneel vir die Thutuka-program, gerig op nadoktorale navorsers in Chemie, asook navorsers wat nog aan die begin van hul loopbane staan. Dr Katherine de Villiers-Chen het as beoordeelaar opgetree by die streeksuitdunne van die Eskom Ekspo vir Jong Wetenskaplikes.

Personeelle het in redaksies van verskeie nasionale en internasionale vaktydskrifte gedien. Prof Catherine Esterhuysen was 'n redaksielid van die Namibiese vaktydskrif *International Science & Technology Journal*, en Prof Willem van Otterlo was die wetenskapsredakteur (Organiese Chemie) van die *South African Journal of Chemistry*. Prof Len Barbour het in die redaksie van die *New Journal of Chemistry* gedien, sowel as in die redaksionele advieskomitee vir *Crystal Engineering Communications* (beide vaktydskrifte word deur die Koninklike Vereniging vir Chemie uitgegee). Hy is genooi om as redakteur van spesiale vaktydskrifuitgawes op te tree: naamlik *Chemical Communications* (oor die vasvang van CO₂) en *Crystal Engineering Communications* (oor Makrosikliese Chemie). Prof Bert Klumperman was lid van *ChemZA* se redaksionele raad en van die redaksionele adviesraad vir *Transactions of the Royal Society of South Africa*. Hy was ook die redakteur van die *European Polymer Journal*.

Toekennings aan personeel en studente

Dr André de Villiers is deur die Chromatografiese Vereniging van Suid-Afrika (ChromSA) aangewys as die Chromatografis van die Jaar. Hierdie toekenning is tydens die ChromSAAMS Konferensie (Suid-Afrika) gemaak.

Al die toekennings vir uitnemende studenteprestasies het in 2012 aan ons vroulike studente gegaan. Me Leandi van der Westhuizen het die SMM-prys vir die beste BSc-honneursstudent in Chemie gekry. Me Alet van der Westhuizen, me Leanne Brits en me Nicola Steyn het almal Element Six DWT/NNS Sentrum vir Uitnemendheid-toekennings vir hulle prestasie in Polimeerwetenskap gekry, en me Carla Egen het die Jooste Nagraadse Toekenning vir Tekstielwetenskap gekry.

Personeelsake

Die Universiteit se glasblaser, mnr Eric Ward, moes ongelukkig in 2012 aftree. Gelukkig

US skeikundiges ontwikkel nuwe skeidingstegniek

Skeikundiges van die Universiteit Stellenbosch is deur navorsing uit die jare vyftig geïnspireer om 'n nuwe proses te ontwikkel wat die skeiding van xileen ('n chemiese stof afkomstig van ruolie) vinniger en meer energiedoeltreffend te maak.

Die proses kan aangewend word in die vervaardiging van pigment vir die verfindustrie, die vervaardiging van swamdoders, polimere en verskillende tipes plastiek wat vandag gebruik word.

Dr Matteo Lusi, wat tot onlangs 'n postdoktorale genoot in die Departement Chemie en Polimeerwetenskap was, het die navorsing gedoen in samewerking met prof Len Barbour, houer van die Suid-Afrikaanse navorsingsleerstoelinisiatief (ook bekend as SARChI) in nanogestruktureerde funksionele materiale aan die US.

Die navorsing is in die top skeikundetydskrif, Angewandte Chemie, gepubliseer en het ook erkenning geniet in nuusartikels in Chemistry World, die nuustydskrif van die Koninklike Vereniging vir Skeikunde, asook in Chemical and Engineering News, wat deur die Amerikaanse Chemiese Vereniging uitgegee word.

kon ons mnr Malcolm McLean as plaasvervanger in hierdie belangrike pos aanstel. Mnr Ward, 'n meesterklasblaser, sal egter steeds help totdat die nuutaangestelde persoon ook meesterklasblaser-status binne die volgende twee jaar verkry.

Dr Rehana Malgas-Enus is as lektor aangestel na die bedanking van dr Alpheus Mautjana, wat na die VSA verhuis het.

Gemeenskapsinteraksie

Die departement en prof Harald Pasch van Polimeerwetenskap, het deur hulle finansiële ondersteuning twee leerders van die Kaya-mandi Hoërskool in staat gestel om aan 'n wetenskapskou in China deel te neem.

Samewerking

SUID-AFRIKA

Departement van Wetenskap en Tegnologie, Suid-Afrikaanse Navorsingsleerstoel Program (SARChI)
 Durban Universiteit van Tegnologie
 Kaapse Skiereiland Universiteit van Tegnologie
 Nelson Mandela Metropolitaanse Universiteit
 Universiteit van die Witwatersrand
 Universiteit van Fort Hare
 Universiteit van Johannesburg
 Universiteit van Kaapstad
 Universiteit van KwaZulu-Natal
 Universiteit van Pretoria
 Universiteit van Suid-Afrika
 Universiteit van die Wes-Kaap
 Walter Sisulu Universiteit

INTERNASIONAAL

Australië

Universiteit van Monash
 Universiteit van Wes-Australië

België

Katolieke Universiteit Leuven
 Universiteit Gent
 Vrije Universiteit Brussel

Duitsland

Bergische Universität GH Wuppertal
 Deutsches Kunststoff Institut
 Heraeus Holding GmbH
 Max Planck Institute for Colloids and Interfaces
 Tegniese Universiteit van München
 Universiteit van Duisburg
 Universiteit van Erlangen-Nuremberg
 Universiteit van Leipzig
 Universiteit van Münster
 Universiteit van Ulm

Indië

Indiese Instituut van Tegnologie Kanpur

Kanada

Universiteit van Waterloo

Mauritius

Universiteit van Mauritius

Nederland

Delft Universiteit van Tegnologie
 Eindhoven Universiteit van Tegnologie
 Universiteit van Leiden-Gorleus Laboratorium
 Universiteit Utrecht

Oostenryk

Borealis
 Mondi

Pole

Poolse Akademie van Wetenskappe

Swede

Chalmers Instituut van Tegnologie
 Lund Universiteit
 Sweedse Koninklike Instituut van Tegnologie

Tsjeggiese Republiek

Tegniese Universiteit van Liberec

Verenigde Koninkryk

Cardiff Universiteit
 Durham Universiteit
 Universiteit van Cambridge
 Universiteit van Leeds
 Universiteit van St Andrews, Skotland

Verenigde State van Amerika

Cornell Universiteit
 Universiteit van Kalifornië, Berkeley
 Universiteit van Missouri-Kansas City
 Universiteit van North Carolina
 Universiteit van Southern Mississippi
 Universiteit van Wisconsin-Madison

Befondsing

Anglo Platinum
 BASF
 BioPAD
 Borealis
 Deutsches Kunststoff Institut
 ESKOM
 Harmony Gold
 Heraeus Holding GmbH, Duitsland
 Ikkusa Chemicals
 KWW
 Mintek
 Mondi
 Nasionale Navorsingstigting
 Nasionale Toerustingprogram
 Nederlandse Polimeer Instituut
 NNS Thuthuka
 Plascon
 Program vir Tegnologie en Menslike Hulpbronne vir die Nywerheid (THRIP)
 Sasol
 Sastech
 Suid-Afrikaanse Navorsingsleerstoel Inisiatief (SARChI)
 Watervorsingskommissie

Personeel**Doserend**

Prof KR Koch (*departementele hoof*)
 Dr GE Arnott
 Prof LJ Barbour
 Dr MAL Blackie
 Dr L Cronje
 Prof AJ de Villiers
 Dr K De Villiers-Chen
 Prof JLM Dillen
 Prof C Esterhuysen
 Dr WJ Gerber
 A Gericke
 Dr DA Haynes
 Prof EP Jacobs
 Prof L Klumperman
 Dr T le Roex
 Dr M le Roux
 Dr RC Luckay
 Dr M Lutz
 Prof PE Mallon
 Prof SF Mapolie
 Dr N Mautjana
 Prof H Pasch
 Dr SC Pelly
 Prof WAL van Otterlo
 Prof AJ van Reenen
 Dr PFM Verhoeven

Buitengewone professore

Prof W Hiller
 Prof WM Mackenroth
 Prof PJF Sandra

Buitengewone navorser

Dr JB McLeary

Emeritus professore

Prof BV Burger
 Prof PS Steyn
 Prof HG Raubenheimer
 Prof R Sanderson

Ondersteuningspersoneel

JG Goldie (*departementele bestuurder*)
 JE Joubert
 SG May
 D Davids
 Dr MJ Hurndall
 MMG Cooper
 AE Fourie
 WJ Adonis
 LD Bailey
 M Bickerstaff
 MC de Jongh
 JD Groenewald
 Dr GW Harding

D Isaacs
 MC Johnson
 DJ Koen
 R Lawrence
 CW Maart
 MG Marupula
 S Mohamed
 JS Motshweni
 J Smit
 PJ Steyn
 M Taylor
 A van Zaal
 U Wanza
 E Ward
 D Wenn
 GR Willemse

Navorsers met NNS-graderings**Toonaangewende internasionale navorser**

Prof Len Barbour
(funksionele nanogestruktureerde materiale)
 Prof Bert Klumperman
(polimerisasie van lewende radikale en gevorderde makromolekulêre argitektuur)

Internasionaal erkende navorser

Prof Ben Burger
(chemiese kommunikasie in lewende organismes)
 Prof Harald Pasch
(analitiese polimeerwetenskap, multidimensionele chromatografie)
 Prof Helgard Raubenheimer
(ligand-ontwerp gerig op toepassings in homogene katalise; goudchemie)
 Prof David McLachlan
(elektriese en magnetiese eienskappe van komposiete)
 Prof Klaus Koch
(platinumgroepmetale)
 Prof Willem van Otterlo
(organiese sintese en medisinale chemie)

Gevestigde navorser

Prof Ron Sanderson
(polimeriese materiale)
 Prof Catharine Esterhuysen
(intermolekulêre interaksies)
 Prof Ed Jacobs
(membrane en prosesontwikkeling)



Dr Njabu Gule, dr Rueben Pfkwa, dr Nathalie Bailly en dr Osama Bshena met hul studieieier, prof Bert Klumperman.

Polimeerprofessor trots op sy vier nuwe doktore

Vier doktorale studente wat almal dieselfde studieieier gedeel het, was onder die stewige oes van nuwe doktore wat gedurende 2012 van die Fakulteit Natuurwetenskappe hulle grade ontvang het.

Prof Bert Klumperman was die studieieier van **dr Njabu Gule**, **dr Rueben Pfkwa**, **dr Nathalie Bailly** en **dr Osama Bshena**. Prof Klumperman beklee die Suid-Afrikaanse Navorsingsleerstool (SARChI) in Gevorderde Makromolekulêre Argitektuur in die Departement Chemie en Polimeerwetenskappe.

Dr Bailly se nvaorsing het gefokus op die aflewering van anti-gewas geneesmiddels. Dr Gule het gehelp om die nanovesels te ontwikkel wat gebruik is om die Universiteit Stellenbosch Waterinstituut se teesakkiefilter te ontwikkel. Antimikrobiese polimeernanoveseltegnologie wat ontwikkel is deur dr Bshena en prof Klumperman kan gebruik word om die verspreiding van bakterieë in die lugfilters van hospitale te bekamp.

Die titel van dr Pfkwa se verhandeling is "Hiërargiese self-samevoeging van nuwe para-atriasool spiraal voumere".

Foto: Engela Duvenage



Khumbulani Ntshidi en Abongile Hlaleleni het hulle plakkaat by die Departement Chemie en Polimeerwetenskap voorgedra.

Kayamandi-leerders vertel US chemici meer oor hulle Ekspo-projek

Twee leerders van Kayamandi Hoërskool, wat aan 'n wetenskapskou in China deelgeneem het as gevolg van hulle betrokkenheid by die Eskom Ekspo vir Jong Wetenskaplikes, was die gaste van die Departement Chemie en Polimeerwetenskap aan die Universiteit Stellenbosch.

Abongile Hlaleleni en **Khumbulani Ntshidi** het 'n kort aanbieding oor hulle navorsingsprojek gedoen en ook 'n oorsig oor hulle ondervindings in China gegee.

Dit volg op die ondersteuning wat hierdie twee graad 11-leerders van die Departement Chemie en Polimeerwetenskap ontvang het. Laasgenoemde het tesame met ander plaaslike organisasies gehelp om die oorsese besoek te borg.

Prof Peter Mallon
(komplekse polimeriese materiale en polimeriese nano-komposiete)

Prof Selwyn Mapolie
(homogene katalise via dendrimeriese komplekse)

Prof Albert van Reenen
(poliolefiene)

Dr Robbie Luckay
(ligand-ontwerp vir metaalioon-koördinasie in industriële en mediese toepassings)

Ontvanger van NNS prestige-toekening

Dr James McLeary
(omgewingsvriendelike polimere vir belaging-toepassings)

Belowende jong navorser

Dr André de Villiers
(skeidingswetenskap beginsels en toepassings)

Dr Delia Haynes
(kristalmanipulasie van nie-metaalbevattende materiale)

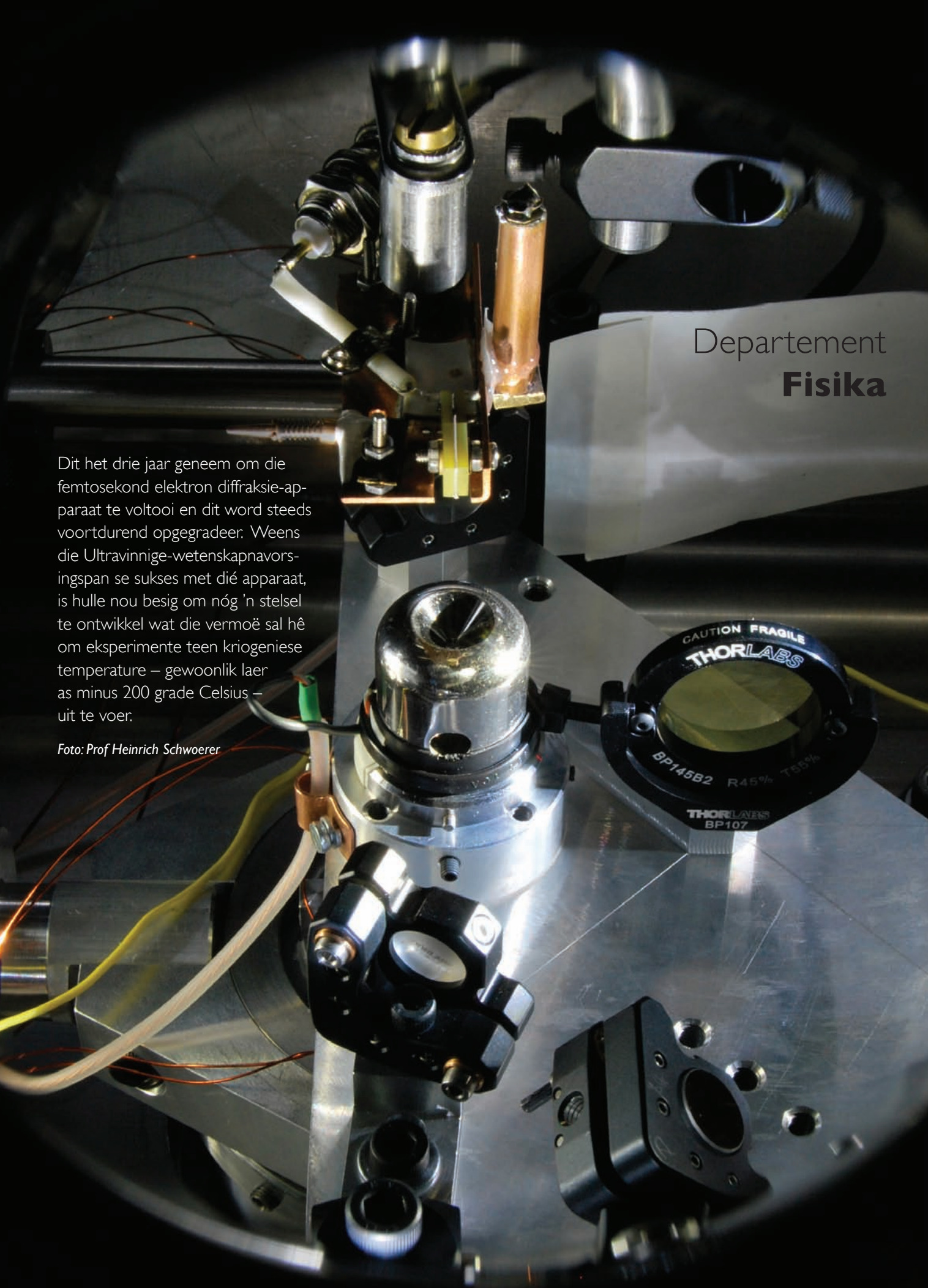
Dr Gareth Arnott
(inherent chirale kaliksarene; asimmetriese metodologie)

Dr Stephen Pelly
(medisinale chemie-geneesmiddel ontwerp en sintese)

Departement
Fisika

Dit het drie jaar geneem om die femtosekund elektron diffraksie-aparaat te voltooi en dit word steeds voortdurend opgegradeer. Weens die Ultravinnige-wetenskapnavorsingspan se sukses met dié apparaat, is hulle nou besig om nóg 'n stelsel te ontwikkel wat die vermoë sal hê om eksperimente teen kriogeniese temperature – gewoonlik laer as minus 200 grade Celsius – uit te voer.

Foto: Prof Heinrich Schwoerer



Departement Fisika

Navorsingsbelange

Laserfisika (spektroskopie en ultravinnige wetenskap); kernfisika (reaksiekansvlak van proton met atoomkerne); teoretiese fisika (komplekse sisteme en gekondenseerde materie)

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	48
Redaksionele aktiwiteit (boeke en vaktydskrifte)	11
Boeke, konferensieverrigtinge, hoofstukke in boeke	1
MSc-studente in 2012 gegradueer	11
PhD-studente in 2012 gegradueer	5

Navorsingshoogtepunte

Die nuwe energienavorsingsprojek by die Lasernavorsingsinstituut het afgekom op fundamentele lig-geïnduseerde ladingsdinamika in sonkragselle wat met kleurstof gesensitiseer is. Hierdie aktiwiteit – wat internasionale samewerking tussen prof Heinrich Schwoerer (SARChI-leerstoel in Fotonika) en prof Derck Schlettwein van die Instituut vir Toegepaste Fisika aan die Universiteit van Giessen (Duitsland), dr Christian Litwinski van PicoQuant in Berlyn (Duitsland) en prof Tebello Nyokong van die Departement Chemie aan Rhodes Universiteit (Suid-Afrika) behels – is daarop toegespits om nuwe toestelle vir die opvang van sonlig doeltreffender en toepasliker te maak.

Die Ultravinnige-wetenskapnavorsingsgroep, onder leiding van prof Heinrich Schwoerer, het 'n wêreldklasapparaat vir femtosekonde-elektronendiffraksie ontwikkel, waarmee strukturele dinamika met temporele en ruimtelike atoomresolusie ondersoek kan word. Een van die hoogtepunte in 2012 wat molekulêre elektronika betref, was die waarneming van 'n strukturele en elektroniese faseoorgang in 'n sterk gekorreleerde kristal.

PhD-student me Zikona Ndlovu het deelgeneem aan 'n proefneming by die Gesamentlike Instituut vir Kernnavorsing (JINR) (Rusland), waar daar deur middel van neutronaktivering gemeet is watter spoorelemente van besoedelende stowwe voorkom in

mos- en ligenmonsters wat in die omgewing van Stellenbosch ingesamel is. Me Ndlovu het die prys vir die beste mondelinge aanbieding in kernfisika van die Suid-Afrikaanse Instituut vir Fisika ontvang vir haar werk oor die gebruik van mos en ligene om lugbesoedeling in die Wes-Kaap te monitor.

Dr Paul Papka was gemoeid met die reëlings vir die werksessie "Nuclear Spectroscopy Frontiers", wat by iThemba LABS plaasgevind het. Proff Shaun Wyngaardt en Richard Newman het die 3de Suid-Afrika/JINR-simposium op Stellenbosch sowel as die 2de Suid-Afrika/China-simposium op Somerset-Wes gereël.

PhD-student mnr Cobus Swartz het die Universiteit van Birmingham besoek om saam met prof Martin Freer aan teoretiese berekeninge te werk vir sy navorsing oor die soeke na die Hoyle-agtige toestand deur middel van die reaksie $^{22}\text{Ne}(p,t)^{20}\text{Ne}$. Mnr JJ van Zyl het 'n referaat getiteld "Angular distributions of the analysing power in the excitation of low lying states of ^{56}Co " by die 13de internasionale konferensie oor kernreaksiemeganismes in Varenna (Italië) aangebied. Daarbenewens het hy ook 'n voorlegging getiteld "Incident-energy dependence of the analysing power in the $^{58}\text{Ni}(p,^3\text{He})^{56}\text{Co}$ reaction between 80 and 120 MeV" by die internasionale konferensie oor kernstruktuur en verwante onderwerpe in Dubna (Rusland) gedoen.

Me Elsje Opperman en mnre Erasmus

Kontakinligting

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du Toit en Wiggert Brummer – ál drie honneursstudente in Kernfisika – het deelgeneem aan die SA/JINR-somerskool. Gaste by die somerskool het verskeie internasionale navorsers ingesluit, waaronder prof Fedor Simkovic van die Comenius Universiteit (Slowakye), prof Ivan Stekl van die Tsjeggiese Tegniese Universiteit (Praag), prof Phil Woods van die Universiteit van Edinburg (Skotland), prof Marina Frontasyeva van die JINR (Rusland), sowel as proff Peiwen Ji en Men Pu van die Nasionale Wetenskapstigting van China.

Die Lasernavorsingsinstituut was gasheer vir 'n aantal internasionale laserwetenskaplikes. Onder dié gaste was prof Herbert Stafast van die Jena-instituut vir Fotoniese Tegnologie (Duitsland), wat reeds vir meer as tien jaar betrokke is by vakuum-ultraviolet-spektroskopie en nie-linéêre optika.

Ander navorsers wat die Instituut besoek het, was proff Regina de Vivie-Riedle en Eberhard Riedle van die Ludwig-Maximiliaanse Universiteit van München (Duitsland), prof Tony Parker van Rutherford Appleton Laboratories (VK), prof Thomas Feuerer van die Universiteit van Bern (Switserland), dr Alexander Heidt van die Sentrum vir Navorsing oor Opto-elektronika aan die Universiteit van Southampton (VK), en prof Markus Schwoerer as medewerker aan 'n projek oor faseoorgang in organiese vastestowwe, wat deur die Duitse Navorsingstigting (DFG) gefinansier is.

Prof Heinrich Schwoerer (SARCH-leerstoel in Fotonika) het 'n werksessie oor ultravinnige strukturele dinamika by die Stellenbosse Instituut vir Gevorderde Navorsing, oftewel STIAS, gelei. Tutoriaallesing-reeks is aangebied deur prof Konrad Samwer (Göttingen), prof Dwayne Miller (Hamburg/Toronto), prof Dieter Vollhardt (Augsburg), prof Steve Johnson (Zürich), prof Markus Schwoerer (Bayreuth), dr Marcus Kollar (Augsburg) en dr Günther Kassier (Hamburg).

Die Optiese Vereniging van Amerika (OSA) se studenteafdeling aan die Universiteit Stellenbosch (US) het prof Tom Birks van die Universiteit van Bath vir 'n werksessie genooi. Die studente

van die OSA se US-afdeling, tesame met nagraadse studente in Teoretiese Fisika, het gedurende 'n week lange uitreikprogram tien hoërskole in die Wes-Kaap besoek.

PhD-student mnr Nicolas Erasmus het 'n gaslesing oor die ladingsdigtheidsdinamika in tantaaldiseleniet by die tweede Banff-byeenkoms oor strukturele dinamika in materie (Kanada) gelewer. Dr Günther Kassier het by dieselfde geleentheid 'n deelnemerpraatjie gelewer en 'n plakkaat aangebied.

PhD-student mnr Egmont Rohwer het 'n plakkaat oor sy sonkragselprojek getiteld "Photoinduced charge transfer between Indoline D149 and porous ZnO" by die 18de Internasionale Konferensie oor Ultravinnige Fenomene (Switserland) aangebied, terwyl prof Heinrich Schwoerer by dieselfde geleentheid 'n mondelinge voorlegging oor die strukturele dinamika projek gedoen het.

Alle senior lede van die Lasernavorsingsinstituut het aktief deelgeneem aan die 5de studentewerksessie van die Afrika-lasersentrum, wat in Namibië gehou is. Prof Piet Walters het weer as administratiewe organiseerder van die geleentheid opgetree. PhD-student mnr Wilfrid Ndebeka en MSc-studente mnre Raphael Okoye en Farooq Kyeyune het mondelinge aanbiedings oor hul navorsingsprojekte gedoen. Mnr Ndebeka, PhD-student mnr Dirk Spangenberg sowel as honneursstudent me Thandeka Mhlanga het die eerste Afrika-konferensie van die Internasionale Studentenetwerk van die Optiese Vereniging van Amerika (IONS), bygewoon.

Verskeie lede van die Universiteit Stellenbosch se Instituut vir Teoretiese Fisika (ITF) het hul werk by internasionale konferensies en werksessies aangebied, sowel as by die jaarkonferensie van die Suid-Afrikaanse Instituut vir Fisika in Pretoria. Die meeste lede van die ITF was ook aktief betrokke by die een of ander navorsingsaktiwiteit van die Nasionale Instituut vir Teoretiese Fisika (NITheP) en het ook as medestudieleiers vir studente opgetree. ITF-studente het deurlopend bygedra tot uitreikprojekte van die Departement

Fisika, onder meer 'n toer in September 2012 na skole in die Overberg-streek as deel van 'n uitreikaktiwiteit deur studente van die Lasernavorsingsinstituut.

Nóg 'n navorsingshoogtepunt was toe proff Herbert Weigel (Stellenbosch) en Hugo Reinhardt (Universiteit van Tübingen, Duitsland) opnuut ondersoek ingestel het na die aard van sterk wisselwerking kondensate, en onlangse bewerings weerlê het dat dié kondensate hadronies eerder as vakuum-aardig van aard is. Die artikel wat daaruit gespruit het, het in April 2012 in *Physical Review D* verskyn.

Prof Hans Eggers het die 8ste werksessie oor deeltjiekorrelasies en femtoskopie, oftewel die WPCF12, by die Frankfurtse Instituut vir Gevorderde Navorsing bygewoon, gevolg deur navorsingsbesoeke aan die Instituut vir Hoë-energiefisika in Wene (Oostenryk) en die Max Planck Instituut vir Fisika in München (Duitsland).

Prof Kristian Müller-Nedebock het met kollegas van die Departement Chemie en Polimeerwetenskap saamgespan as medeskrywers van 'n navorsingstuk oor sorpsie in poreuse materiaal wat in *Angewandte Chemie* gepubliseer is.

Ander navorsingsaktiwiteite het onder meer oor verskeie aspekte van gekondenseerde materiestelsels gehandel, sowel as werk op die gebied van nie-kommuteerbare formalisme in kwantumeganika deur dr Hannes Kriel en prof Frederik Scholtz.

Akademiese sake

Die Departement Fisika was bevoorreg om saam met die Sentrum vir Onderrig en Leer (SOL) as gasheer op te tree vir die hoog aangeskrewe fisikus prof Eric Mazur van Harvard Universiteit, sowel as me Angelica Natera, mededirekteur vir akademiese innovasie by LASPAU, 'n organisasie sonder winsbejag wat by Harvard geaffilieer is. Personeel van alle fakulteite het na prof Mazur se aanbieding, "Confessions of a converted lecturer", geluister, waarna me Natera 'n werksessie oor die bevordering en handhawing van onderrig-innovasie gefasiliteer het.

MSc-student me Andrea von Flotow en PhD-student mnr Egmont Rohwer het na



Prof Eric Mazur

Toonaangewende fisikus besoek US

Die Universiteit Stellenbosch se Fisika Departement het op 28 Mei 2012 as gasheer opgetree vir die leidinggewende fisikus van Harvard Universiteit, **prof Eric Mazur**. Behalwe vir verskeie toekennings vir sy werk in Fisika, het prof Mazur 'n besondere belangstelling in onderrig, en word hy as wêreldleier op die gebied van innovasie in onderrig gereken.

Gedurende sy aanbieding het prof Mazur verduidelik hoe hy tot die verstommende gevolgtrekking gekom het dat sy manier van klasgee veroorsaak het dat studente faal, omdat hulle slegs inligting gememoriseer het en nie geleer het hoe om die materiaal te verstaan nie. Hy het getoon, met ondersteunende data, hoe studente se prestasie aansienlik verbeter het nadat hy sy onderrigmetodes aangepas het.

Amerika gereis om die Stellenbosse studenteafdeling vir laserstudies by onderskeidelik die jaarbyeenkoms van die Internasionale Vereniging vir Optika en Fotonika en dié van OSA te verteenwoordig.

Diens aan die wetenskaplike gemeenskap

Personeellede het nou met verskeie nasionale rade, organisasies en skole saamgewerk en ook internasionale konferensies help reël.

Prof Frederik Scholtz dien as direkteur van die Nasionale Instituut vir Teoretiese Fisika (NITheP), terwyl prof Hendrik Geyer die direkteur van die Stellenbosse Instituut vir Gevorderde Navorsing (STIAS) is.

Prof Frederik Scholtz het ook in die direksie van die Suid-Afrikaanse Instituut vir Fisika gedien. Hy is boonop voorsitter van die Instituut se Afdeling Teoretiese Fisika. Prof Erich Rohwer dien as voorsitter van die Instituut se Afdeling Fotonika.

Prof Rohwer dien voorts in die beheerkomitee van PISA, die Suid-Afrikaanse fotonika-inisiatief, terwyl prof Hubertus van Bergmann 'n direkteur van die Afrika-lasersentrum (ALC) is.

Die Instituut vir Lasernavorsings het die 5de ALC-studentewerksessie aangebied, en prof Piet Walters het die reëlings behartig. Altesaam 60 studente en navorsers van 17 instellings uit 19 lande het die geleentheid bygewoon. Die gassprekers was prof Thomas Feurer van die Universiteit van Bern (Switserland), dr Alexander Heidt van die Universiteit van Southampton (VK) en prof Mourad Zghal van die Universiteit van Kartago (Tunisië).

Dr Paul Papka is voorsitter van die Fisika Advieskomitee vir die Oopsektorsiklotron Fasiliteit by iThemba LABS, sowel as 'n lid van die Fisika Advieskomitee van hulle Departement Materiaalnavorsing.

Die Departement Fisika het ook weer sy jaarlikse, week lange inleidende kursus oor induktief gekoppelde plasmas (ICP) aangebied.

Toekennings aan personeel en studente

Prof Heinrich Schwoerer kon daarin slaag om vir 'n verdere vyf jaar finansiering vir die SARChI-leerstoel in Fotonika te bekom.

'n Toppresteerder-eerstejaar het prof Richard Newman benoem as die dosent wat die grootste bydrae tot dié student se sukses in sy eerste akademiese jaar gelever het.

Honneursstudent mnr Erasmus du Toit het die Fakulteit Natuurwetenskappe se Meiring Naudé-medalje vir die beste kandidaat in 'n BSc-honneursprogram in Fisika ontvang. By die 3de Asië-konferensie van IONS in China is mnr Nagla Numan-Ali se plakkaat as die beste aangewys.

Nagraadse studente van die Departement Fisika het ook verskeie pryse ontvang by die jaarlikse konferensie van die Suid-Afrikaanse Instituut vir Fisika, wat by die Universiteit van Pretoria gehou is. Die prysweners was me Melanie McLaren (vir die beste mondelinge voorlegging deur 'n PhD-student op die gebied van fotonika), me Zikhona Ndlovu (vir die beste mondelinge voorlegging deur 'n PhD-student op die gebied van kernfisika), mnr Wayne Koen (vir die beste werk in toegepaste fotonika), mnr Darryl Naidoo (vir die beste PhD-voorlegging op grond van 'n publikasie), me Andrea von Flotow (vir die beste plakkaat deur 'n MSc-student op die gebied van fotonika), mnr Riaan Coetzee (vir die beste mondelinge voorlegging deur 'n MSc-student op die gebied van fotonika) en me Thandeka Mhlanga (vir die beste plakkaataanbieding deur 'n honneursstudent in fotonika). By 'n konferensie vir nagraadse beursstudente van die radioteleskoop-projek SKA Africa het me Marissa Geyer die prys vir die beste voorlegging deur 'n MSc-student ontvang. Me Chrishelle Hanekom is met 'n Rektorstoekening vir uitnemende prestasie in leierskap beloon.

Die Universiteit het ook die werk van die departement se personeel beloon. Me Heleen Randall, mnr Stanley February, prof Erich Rohwer, dr Paul Papka, mnr JJ van Zyl en mnr Gerhard Louwrens het almal Rektorstoekennings vir uitnemende prestasie ontvang.

Personeelsake

Prof Richard Newman het van iThemba LABS geskuif om hom as medeprofessor by die Kernfisika-groep aan te sluit.

Dr Pieter Neethling is as dosent in die Laser-groep aangestel.

Proff Brandon van der Ventel en Shaun Wyngaardt is tot medeprofessors en dr Lee Boonzaaier tot senior dosent bevorder.

Prof Hubertus von Bergmann is as buitengewone professor in Laserfisika aangestel.

Dr Pieter van der Westhuizen het in Maart ná 33 jaar by die departement afgetree.

Gemeenskapsinteraksie

Die uitreikomitee van die departement was weer baie aktief. Personeel én nagraadse studente het tot Maties Natuurwetenskappe Winterweek, die jaarlikse Universiteit Stellenbosch Opedag sowel as die Eskom Ekspo vir Jong Wetenskaplikes bygedra.

Nagraadse studente van die Stellenbosch Studenteafdeling van die Optiese Vereniging van Amerika (OSA), wat deel uitmaak van die Instituut vir Lasernavorsing sowel as die Instituut vir Teoretiese Fisika, het gedurende 'n week lange uitreiktoer tien skole in die Overberg-distrik besoek. Die toergroep het finansiële ondersteuning van OSA, die Internasionale Vereniging vir Optika en Fotonika (SPIE), NITheP en die Universiteit Stellenbosch ontvang.

Die departement het finansiering van die Suid-Afrikaanse Agentskap vir Wetenskap en Tegnologiebevordering (SAASTA) bekom om geleentheid te reël om studente aan te spoor om aan die wetenskap deel te neem. Voorgraadse studente het iThemba LABS, die Suid-Afrikaanse Nasionale Ruimteagentskap (SANRA) op Hermanus en die Instituut vir Mariene Tegnologie (IMT) in Simonstad besoek. Die departement het ook leerders van die Sekondêre Skool Oscar Mpetha ontvang en hulle met behulp van 'n eenvoudige tikkerlint-proefneming aan die basiese tegnieke van dataverkryging en -ontleding blootgestel. Die medeborg van die geleentheid was iThemba LABS.

Proff Richard Newman en Shaun Wyn-gaardt het in samewerking met personeel van iThemba LABS 'n uitreikprojek na die sekondêre skole Cloeteville, Kayamandi, Kylemore en Lückhoff sowel as Paul Roos Gimnasium onderneem om leerders aan kern- en omgewingswetenskap bekend te stel deur die radonvlakke in hul huise te meet.

Samewerking

SUID-AFRIKA

iThemba LABS
Nasionale Instituut vir Teoretiese Fisika (NITheP)
Rhodes Universiteit
Square Kilometre Array
Universiteit van die Vrystaat
Universiteit van die Wes-Kaap
Universiteit van Kaapstad
Universiteit van Pretoria
Wetenskaplike en Nywerheidsnavorsingsraad, Nasionale Lasersentrum

AFRIKA

Afrika Instituut vir Wiskundige Wetenskappe (AIMS)
Afrika Lasersentrum
Afrika Teoretiese Fisika-program by die Stellenbosse Instituut vir Gevorderde Navorsing (STIAS)

INTERNASIONAAL

China

Skool vir Fisika, Beijing Universiteit

Duitsland

Institut für Photonische Technologien Jena e.V.
Instituut vir Toegepaste Fisika, Universiteit van Giessen
PicoQuant
Universiteit van Tübingen

Indië

S.N. Bose Nasionale Sentrum vir Basiese Wetenskappe
Wetenskaplike Navorsingslaboratorium (PRL),
Ahmedabad

Rusland

Gesamentlike Instituut vir Kernkragnavorsing (JINR)

Verenigde Koninkryk
Rutherford Appleton Laboratorium (RAL)
Universiteit van Bristol

Verenigde State van Amerika

Syracuse Universiteit

Befondsing

Deutsche Forschungsgemeinschaft
Deutscher Akademischer Austauschdienst (DAAD)
Earth Anti-Neutrino Tomograph (EARTH) Stigting
Innovasiefonds van die Departement van Wetenskap en Tegnologie (DWT)
iThemba LABS
Korrelbed Modulêre Reaktor (KBMR)
Nasionale Instituut vir Teoretiese Fisika (NITheP)
Nasionale Navorsingstigting (NNS)
Optiese Vereniging van Amerika (OSA)
Scientific Development and Integration
Square Kilometre Array (SKA)
Suid-Afrikaanse Navorsingsleerstoel Inisiatief (SARChI)
Wetenskaplike en Nywerheidsnavorsingsraad se program vir Verdediging, Vrede, Veiligheid en Sekerheid (DPSS)
WNNR Nasionale Lasersentrum (NLS)

Personeel

Doserend

Prof EG Rohwer (*uitvoerende hoof*)
Dr L Boonzaaier
C Dreyer
Dr A du Plessis
Prof HC Eggers
Prof HB Geyer
Dr H Kriel
Prof KK Müller-Nedebock
Dr PH Neethling
Prof RT Newman
Dr P Papka
Prof FG Scholtz
Prof HPH Schwoerer
Dr JA Stander
Dr CM Steenkamp
Prof BIS van der Ventel
Dr P van der Westhuizen
JJ van Zyl
Prof H Weigel
Prof SM Wyngaardt

Buitengewone professore

Dr A Avdeenkov
Dr LR Botha
Prof AA Cowley
Prof T Dlamini
Prof CA Dominguez
Prof A Forbes
Prof WD Heiss
Prof M Kastner
Prof J Meng
Prof T Parker
Dr I Snyman
Prof H Stafast
Prof HM von Bergmann

Emeritus professore

Prof PR de Kock
Prof PE Walters

Ondersteuningspersoneel

C April
DC Beukman
AS Botha
MC Botha
J Burns
SH February
JM Germishuizen
GJ Louwrens
CD Pool
DP Pool
H Randall
CJ Ruperti
EJ Shields

Teoretiese fisici bevestig die vakuum-aard van sterk wisselwerking kondensate

US fisikus prof **Herbert Weigel** en prof **Hugo Reinhardt** van Tübingen Universiteit (Duitsland) het die aard van sterk wisselwerking kondensate herondersoek en onlangse bewerings dat hierdie kondensate hadronies eerder as vakuum-aardig van aard is, verkeer bewys. Hierdie bevinding het in 'n artikel in die April 2012 uitgawe van Physical Review D verskyn.

Prof Weigel het die volgende populêre opsomming van hul werk voorsien:

In Fisika word daar onderskei tussen vier fundamentele wisselwerkings: gravitasie, elektromagnetisme en die sterk en swak kernkragte. Gravitasie en elektromagnetisme is goed bekend vanuit alledaagse ervaring. Die twee kernkragte is egter veel minder sigbaar, maar speel 'n sentrale rol op mikroskopiese vlak waar hulle vir die vorming van atoomkerne vanuit protone en neutrone, die sogenaamde nukleone, verantwoordelik is. Nukleone is egter nie self elementêre deeltjies nie, maar is uit meer elementêre kwarke en gluone opgebou. Laasgenoemde word beskryf deur kwantumchromodinamika (KCD), die fundamentele teorie van die sterk wisselwerking. Deeltjies wat hierdie krag ervaar staan gesamentlik as hadrone bekend. Nukleone vorm deel van hierdie breër klas.

KCD is egter 'n uiters gekompliseerde teorie waarvoor direkte oplossings nie verkrygbaar is nie. Eenvoudige modelle moet dus ingespan word om die vorming van die nukleone, en sodoende ook van atoomkerne, te ondersoek.

Hierdie modelle word gekonstrueer om soveel eienskappe as moontlik van KCD te beskryf. 'n Sentrale eienskap van KCD is chirale simmetrie. Dit behels die intrinsieke hoekmomentum ('n eienskap van rotasiebeweging) van deeltjies wat gevoelig is vir die sterk wisselwerking. 'n Gevolg van hierdie simmetrie is dat deeltjies waarvan die hoekmomenta in dieselfde of teenoorgestelde rigting as die bewegingsrigting georiënteer is, nie met mekaar in wisselwerking is nie.

Dit is egter bekend dat hierdie gevolg van chirale simmetrie nie versoenbaar is met die massas van deeltjies wat eksperimenteel gemeet word nie. Hierdie klaarblyklike teenstrydigheid kan egter omseil word indien die laagste energiekonfigurasie, bekend as die vakuumtoestand, nie chirale simmetrie openbaar nie. Hierdie simmetrieverbreking sal dan aanleiding gee tot sogenaamde kondensate wat met nie-nul kwark en gluon waarneembare geassosieer is, maar nogtans nie 'n deeltjie-aard het nie.

Binne hierdie verklaring van die massas van deeltjies is kondensate universeel en word dit nie deur die teenwoordigheid van nukleone geaffekteer nie. Hierdie beeld is egter onlangs bevestig. Indien sulke kondensate nie universeel is nie, sou dit ons beskrywing van energie in die heelal – wat nog in 'n baie vroeë stadium is – radikaal verander.

Onlangs het die idee dat kondensate dalk eerder nukleonies van aard as vakuum-aardig is, heelwat aandag geniet. As antwoord hierop het Reinhardt en Weigel 'n model ondersoek wat ondubbelsinnig uitspraak lewer oor of daar nukleoniese of vakuum-aardige konfigurasies by 'n gegewe punt in die ruimte teenwoordig is. Binne hierdie model berekening is gevind dat die kondensaat verseker vakuum-aardig is en ook buite nukleone kan bestaan. Die eienskappe van die kondensaat kan egter deur die teenwoordigheid van nukleone geaffekteer word.

Navorsers met NNS-graderings

Internasionaal erkende navorser

Dr Alexander Avdeenkov
(teoretiese fisika)

Prof Anthony Cowley
(kernfisika)

Prof Hendrik Geyer
(teoretiese fisika)

Prof Dieter Heiss
(teoretiese fisika)

Prof Michael Kastner
(teoretiese fisika)

Prof Frederick Scholtz
(teoretiese fisika)

Prof Heinrich Schwoerer
(laserfisika)

Prof Herbert Weigel
(teoretiese fisika)

Gevestigde navorser

Prof Hans Eggers
(teoretiese fisika)

Prof Kristian Müller-Nedebock
(teoretiese fisika)

Prof Erich Rohwer
(laserfisika)

Dr Christene Steenkamp
(laserfisika)

Prof Brandon van der Ventel
(kernfisika)

Prof Hubertus von Bergmann
(laserfisika)

Prof Shaun Wyngaardt
(kernfisika)

Belowende jong navorser

Dr Paul Papka
(kernfisika)



Departement **Fisiologiese Wetenskappe**

Op hierdie foto is 'n soogdiersel met 'n gedetailleerde mitochondriale struktuur (rooi) en 'n tubulin-netwerkbou (groen) duidelik sigbaar. Dit is geneem deur die ultramoderne konfokale LSM 780 mikroskoop wat gekoppel is aan 'n hoë-resolusie ELYRA SI platform. Hierdie beeld is verkry deur die gebruik van 'n gespesialiseerde metode, bekend as super-resolusie gestruktureerde illuminasie. Beide die mitochondria en die tubulin-netwerk word met verskeie siektes geassosieer. Die mikroskoop het R8 miljoen gekos en is uit Duitsland ingevoer. Dit is een van enkele mikroskope in die wêreld wat vir die eerste keer die grense van resolusie in ligmikroskopie verskuif het.

Foto: Dr Ben Loos

Departement **Fisiologiese Wetenskappe**

Navorsingsbelange

Metaboliese sindroom, diabetes en hartsiektes (miokardiale iskemie, diabetiese kardiomiopatie); metaboliese sindroom en HIV/Vigs; spierfisiologie en biologie; skeletspieratrofie en -hipertrofie; satelliet-selle en mioblaste; hartmetabolisme, hipoksie en iskemie; multidissiplinêre stresbiologie; kanker en meganismes van seldood; oefenwetenskap

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	16
Boeke, konferensieverrigtinge, hoofstukke in boeke	4
MSc-studente in 2012 gegradueer	8
PhD-studente in 2012 gegradueer	4

Navorsingshoogtepunte

Verskeie personeellede het internasionale en nasionale konferensies bygewoon en voordragte gelewer. Plaaslik is prof Faadiel Essop uitgenooi om voordragte te lewer tydens die Pre-Landelike Navorsingsdag se spitskonferensie oor prioriteite in vigsnavorsing. Hy het ook opgetree as genooide spreker by die navorsingsimposium van die Mediese Navorsingsraad (MNR) se Diabetes Ontdekkingsplatform; die derde Kaapse Wynland ANOVA Konferensie; en die tweede VK-SA Kardiovaskulêre Werskwinkel by die Universiteit van Kaapstad. Prof Essop was die gasspreker by die 40ste Jaarkongres van die Fisiologiese Vereniging van Suider-Afrika wat deur die US se Departement Fisiologiese Wetenskappe aangebied is. Prof Essop het ook na Egipte gereis om as gasspreker deel te neem aan die 6de Internasionale Kongres van die Afrika Vereniging van Fisiologiese Wetenskappe.

Prof Kathy Myburgh het 'n sessie aangebied by die 2012 Eksperimentele Biologie Jaarvergadering in San Diego (VSA) en het 'n simposium by die Amerikaanse Kollege vir Sportmedisyne in San Francisco (VSA) bygewoon. Sy was ook 'n simposiumspreker by die 41ste Europese Spierkongres in Rhodos (Griekeland).

Dr Ben Loos het 'n voordrag met die titel "Die membraanfusie proses van outofagosome en lisosome" gelewer tydens die 50ste jaarlikse konferensie van die Mikroskopie Vereniging van

Suider-Afrika in Kaapstad. By die 40ste Jaarkongres van die Fisiologie Vereniging van Suider-Afrika wat in Stellenbosch gehou is, het hy 'n voordrag met die titel "Super resolusie gestruktureerde illuminasie mikroskopie in sellulêre fisiologie" gelewer.

Die departement publiseer verskeie eweknie-geëvalueerde publikasies in 2012, en 'n rekordgetal nagraadse studente verwerf grade in 2012, waaronder agt MSc- en vier PhD-grade.

Op uitnodiging van Prof Anna-Mart Engelbrecht, spandeer prof Anne Jonassen van die Universiteit van Bergen (Noorweë) een jaar in die departement as deel van haar sabbatsverlof en verstewig sy samewerkingsbande tussen die twee departemente. Sy het saam met dr Bali Sishi en dr Ben Loos aan 'n projek gewerk waar 'n nuwe proteïen met beduidende beskermende eienskappe vir die hart, *in vitro* en *in vivo* getoets is.

Dr Ben Loos het 'n nuwe navorsingsveld, gefokus op seldoodvatbaarheid in neurodegeneratiewe siektes, gevestig. Dit sluit in, onder andere, 'n klassieke selfisiologie-benadering wat neuronale seldood en neuronale migrasie ondersoek; 'n (nano)-biofisiese benadering deur gebruik te maak van super-resolusie illuminasiemikroskopie (in samewerking met prof Kristian Müller-Nedebock en dr Leandro Boonzaier van die Departement Fisika), en 'n sisteembioologie-benadering (in samewerking met prof Jannie Hofmeyr van die Departement Biochemie). Dr

Kontakinligting

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Web www.sun.ac.za/physiologicalsci

Loos het 'n navorsingsbesoek gebring aan Queens College (VSA) waar hy in prof Zarah Zakeri se laboratorium op seldood-meganismes gewerk het. Met behulp van fondse van die Nasionale Nanotegnologie-toerustingprogram het die departement 'n Elyra Super-resolusie-mikroskoop aangekoop. Dié unieke mikroskoop kan superresolusie en konfokale mikroskopie verrig en word in die Selskanderingseenheid van die US se Sentrale Analitiese Fasiliteit gehuisves.

Akademie sake

'n Rekordgetal nagraadse studente het in die departement geregistreer: 15 Hon-neurs-, 17 MSc- en 12 PhD-studente – dit is in lyn met die strategiese beplanning om meer PhD-studente te lewer.

Me Gina Leisching, me Rudo Mapanga, mnr Jamie Imbriolo en me Marie van der Vyver gradueer met doktorsgrade. Vier van die agt MSc-graduandi het hul grade met lof verwerf. Hulle is me Heloise le Roux, mnr Justin Mills, me Lize Engelbrecht en me Clare Springhorn.

Dr Ben Loos het befondsing van die US se Fonds vir Innovasie en Navorsing ontvang om 'n Historiese handboek vir studente te skryf.

Diens aan die wetenskaplike gemeenskap

Prof Faadiel Essop is gekies as raadslid vir die Afrika Vereniging van Fisiologiese Wetenskappe. Hy dien op die redaksionele rade van die *American Journal of Physiology* en die *Open Obesity Journal*, en is 'n lid van die internasionale komitee van die Amerikaanse Fisiologiese Vereniging.

Prof Kathy Myburgh dien as internasionale lid op die organiseringskomitee van die Europese Spierkongres; sy is hooforganiseerder van die 2de Suid-Afrikaanse Stamsel Indaba op Stellenbosch; en tree op as voorsitter van 'n sessie tydens die NNS/SAASTA se Kritiese Denkersforum oor stamselle in Johannesburg. Prof Myburgh is afdelings-redakteur vir die vaktidskrif *Bio Med Central Physiology* en dien op die redaksionele raad *Medicine and Science in Sports and Exercise*.

Prof Anna-Mart Engelbrecht is verkies tot die uitvoerende komitee van die Suid-Afrikaanse Vereniging vir Kardiovaskulêre Navorsing (SASCAR). Sy dien ook op die redaksie van die *International Journal of Biomedical Sciences*. Prof Engelbrecht was voor-

sitter van die reëlingskomitee vir die jaarlikse Fisiologie Kongres van die Fisiologiese Vereniging van Suider-Afrika. Sy is ondersteun deur Prof Anna-Mart Engelbrecht, Ms Grazelda Simon, Dr Theo Nell, Dr Ben Loos, Prof Kathy Myburgh en Prof Carine Smith.

Dr Theo Nell en Prof Anna-Mart Engelbrecht is lede van die Nasionale Navorsingstigting se evalueringspaneel vir die toekenning van NNS-beurse en nadoktorale navorsingsgenootskappe.

Dr Ben Loos het bedank as bestuurder van die Selskanderingseenheid by die US se Sentrale Analitiese Fasiliteit (SAF). Hy bly egter betrokke in 'n raadgevende hoedanigheid ten opsigte van eksperimentele uitdaginge in mikroskopie. Dit sluit die bevordering van voortdurende interaksie tussen die Elektronmikrostralingseenheid en die Selskanderingseenheid in. Dr Loos is ook betrokke by die SAF se opleidingsprogramme in fluoresserende mikroskopie.

Die jaarlikse navorsingsdag vir derdejaarstudente in die natuurwetenskappe is onder meer deur dr Loos georganiseer. Tydens hierdie geleentheid het nagraadse studente kort praatjies oor hul navorsing aangebied ten einde kennis te deel en om voorgraadse studente aan te moedig om nagraadse studies in die Fisiologiese wetenskappe te oorweeg.

Toekennings aan personeel en studente

Die universiteit het weer die uitstekende pogings van ons personeel erken en prof Faadiel Essop, Prof Kathy Myburgh, prof Anna-Mart Engelbrecht en dr De Wet Strauss ontvang prestasietoekennings uit die Rektor se kantoor.

Prof Kathy Myburgh het 'n toekenning van die Amerikaanse Kollege van Sportmedisyne vir 25 jaar se lidmaatskap ontvang.

Verskeie van ons navorsers en studente het toekennings ontvang tydens die 40ste Jaarkongres van die Fisiologiese Vereniging van Suider-Afrika (PSSA). Hulle is dr Lydia Lacerda (beste aanbieding deur 'n gevestigde navorser); me Gina Leisching (Wyndham-toekenning vir die beste voordrag deur 'n student); me Clare Springhorn (Johnny van der Walt-toekenning vir die beste plakkaat); me Yogeshni Govender (beste MSc-voordrag); en me Megan Mitchell (beste voordrag deur 'n honneursstudent).

Doktorale kandidaat Kathleen Reyskens verower die eerste prys met haar aanbieding tydens die tweede VK-SA Kardiovaskulêre Werkwinkel wat deur die Universiteit van

Kaapstad aangebied is.

Verskeie van ons personelede het nuwe navorsingsfondse ontvang. Dr Ben Loos het befondsing van die Mediese Navorsingsraad, die Nasionale Navorsingstigting en Subkom B ontvang. Dr Balindiwe Sishi het navorsingsfondse van die Mediese Navorsingsraad ontvang, terwyl dr Theo Nell, dr Annadie Krygsman en prof Anna-Mart Engelbrecht geld vanaf die Kankervereniging van Suid-Afrika ontvang het.

Personeelsake

Dr Theo Nell het sy MSc-grad in Mediese Wetenskappe (Kliniese Epidemiologie) ontvang.

Gemeenskapsinteraksie

Dr Ben Loos en dr Balindiwe Sishi het as beoordelaars tydens die jaarlikse Eskom Expo vir Jong Wetenskaplikes opgetree. Die meeste van die personeel was betrokke by die jaarlikse Universiteit Stellenbosch Opedag, sowel as die Maties Natuurwetenskappe Winterweek.

Die departement het weer eens 'n baie suksesvolle winterweek met die tema "Fisiologie is cool" vir leerders vanuit voorheen benadeelde hoërskole aangebied. Dr De Wet Strauss het ook weer sy jaarlikse opknappingskursusse vir Biologie-onderwysers aangebied.

Samewerking

SUID-AFRIKA

Kaapse Skiereiland Universiteit van Tegnologie
Nelson Mandela Metropolitaanse Universiteit
Universiteit van Kaapstad

AFRIKA

Kenyatta Universiteit (Kenia)
Universiteit van Botswana (Gaborone)

INTERNASIONAAL

Australië

Griffith Universiteit
Universiteit van Sydney

Kanada

Carleton Universiteit

Frankryk

Universiteit van La Réunion

Griekeland

Universiteit van Thessalië (Trikala)

Hongarye

Biologiese Navorsingsentrum, Hongaarse Akademie vir Wetenskap

Noorweë

Universiteit van Bergen



Kathleen Reyskens

Student geprys vir navorsing oor verband tussen ARB en hartsiekte

Me Kathleen Reyskens, 'n PhD-student in fisiologiese wetenskappe, is geprys vir haar navorsing oor die verband tussen antiretrovirale behandeling (ARB) en hartsiekte in MIV-positiewe mense.

Sy het die eerste plek behaal vir haar aanbieding by die 2de VK-SA Werksessie oor Kardiovaskulêre Navorsing in Kaapstad, 2012. Die doel van die werksessie was om die kollig te plaas op die werk van jong navorsers in die Verenigde Koninkryk en Suid-Afrika, en om vrugbare medewerking in kardiovaskulêre navorsing te bevorder. Die geleentheid is georganiseer deur die Europese Vereniging van Kardiologie (ESC), die Universiteit van Kaapstad en die Suid-Afrikaanse Genootskap vir Kardiovaskulêre Navorsing (SASCAR).

Sy het in 2011 begin met haar PhD-studie onder leiding van **Prof Faadiel Essop**, leier van die kardiometaboliese navorsingsgroep in die Departement Fisiologiese Wetenskappe aan US. In haar navorsing ondersoek sy die nuwe-effekte wat een spesifieke antiretrovirale middel moontlik kan hê, spesifiek in die bevordering van hartsiekte in spesifieke MIV-positiewe pasiënte.

“Ons moet vasstel wat die meganismes onderliggend aan die nuwe-effekte is en hoe die middel moontlik 'n pasiënt se risiko vir die opdoen van spesifieke hartsiektes kan verhoog,” sê Me Reyskens, wat 'n beurs van die Harry Crossley-stigting ontvang het. “Uiteindelik, indien ons kan uitvind hoe dit werk, kan ons moontlik die middel aanpas om die nuwe-effekte te elimineer.”

Volgens Prof Essop is die navorsing belangrik omdat dit blyk dat ARB die toenemende las van kardiometaboliese siektes verder aanwakker.

Verenigde State van Amerika

Universiteit van North Carolina
Pepperdine Universiteit

Befondsing

Amerikaanse Nasionale Gesondheidsinstitute
Europese Unie (HEAIDS)
Kankervereniging van Suid-Afrika
Mediese Navorsingsraad
Nestlé Voedingsinstituut Afrika
Noorweegse Program vir Ontwikkeling, Navorsing en Onderrig (NUFU)
PepsiCo Internasionaal
Suid-Afrika Noorweë samewerkingseinisiatief
Stellenbosch Universiteit

Personeel

Doserend

Prof MF Essop (departementele voorsitter)
Prof KH Myburgh
Prof A-M Engelbrecht
Prof C Smith
Dr JA de Wet Strauss
Dr T Nell
Dr B Loos
Dr B Sishi

Ondersteuningspersoneel

Dr A Krygsman
Dr L Lacerda
Mnr A Isaacs
Me G Simon

Navorsers met NNS-graderings

Internasionaal erkende navorser

Prof Kathy Myburgh
(spierbiologie)

Gevestigde navorser

Prof Faadiel Essop
(hartmetabolisme)

Belowende jong navorser

Prof Anna-Mart Engelbrecht
(seldood en seinweë)

A grayscale micrograph showing numerous rod-shaped bacteria, likely Lactobacillus and Enterococcus, against a dark background. The bacteria are arranged in various orientations, some in chains and some individually. The lighting highlights their smooth, slightly curved surfaces.

Departement **Mikrobiologie**

Melksuurbakterieë van die genera *Lactobacillus* en *Enterococcus*, wat uitgebeeld word, is soortgelyk aan die organismes *Lactobacillus plantarum* en *Enterococcus mundtii* wat in die probiotika entiro™ gebruik word. Dié probiotika bestaan uit lewende, sogenaamde vriendelike melksuurbakterieë wat peptiede produseer en patogene aanval. Prof Leon Dicks se navorsingsgroep in die Departement Mikrobiologie by die Universiteit Stellenbosch was die eerste in Suid-Afrika om antimikrobiese peptiede uit melksuurbakterieë in 'n mediese produk te inkorporeer.

Departement **Mikrobiologie**

Navorsingsbelange

Bioprosessering van landbou-produkte; bioprospektering vir wat plantpoli-sakkariede afbreek; genetiese manipulasie van giste vir die omskakeling van plantmateriaal na bioetanol en die produksie van ensieme/farmaseutiese proteïene in giste en fungi vir gebruik in die vervaardiging van entstowwe; mikrobiologie van bio-ontginning van ertse, arseenweerstandigheid en die skep van bepaalde mutasies en plasmiede van bio-ontginningsbakterieë; taksonomie van melksuurbakterieë; karakterisering van antimikrobiële peptiede (insluitend bakteriosiene) wat deur melksuurbakterieë geproduseer word en die industriële gebruik hiervan; fungus-gemeenskappe van fynbosgrond; biologie van grondfungi, spesifiek *Penicillium* en *Mucor*; die interaksies van giste met hulle biologiese, chemiese en fisiese omgewings; taksonomie van askomisete (fungi); ontwikkeling van probiotiese melksuurbakterieë vir mens en dier; antibiotika-weerstandigheid van waterpatogene; monitering en optimalisering van huishoudelike reënwaterente

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	31
Boeke, konferensieverrigtinge, hoofstukke in boeke	2
MSc-studente in 2012 gegradueer	5
PhD-studente in 2012 gegradueer	4

Navorsingshoogtepunte

Prof Leon Dicks het baanbrekersnavorsing oor melksuurbakterieë onderneem, waarvoor hy die gesogte TW Kambule-prys by die prysuitdeling van die Nasionale Wetenskap- en Tegnologieforum en BHP Billiton ontvang het. Hy het twee bakteriële stamme met antimikrobiële peptiede ontdek wat sommige van die belangrikste patogene in lokale infeksies en spysverteringsprobleme hoogs doeltreffend bestry. Sy navorsing het ook uitgeloop op 'n produk wat Cipla Medpro as entiro™ bemark. Hierdie produk word deur 25 navorsingsreferate ondersteun, is in 65 lande geregistreer, en is sedert 2013 by alle groot Suid-Afrikaanse apteke verkrygbaar.

Daarbenewens het prof Dicks 'n referaat by die 3de internasionale simposium oor antimikrobiële peptiede in Lille (Frankryk) gelewer. Mnr Tiaan Heunis en Du Preez van Staden het by dieselfde geleentheid plakkaataanbiedings gedoen.

Prof Emile van Zyl het 'n voorlegging oor die ontwikkeling van sellulolitiese gis by die 13de internasionale giskongres in Madison, Wisconsin (VSA) gedoen. Hy het ook 'n voordrag gelewer oor gevorderde biotegnologieë vir die produksie van vliegtuigbiobrandstof by die 7de werksessie van SABB, die Brasiliaanse inisiatief vir volhoubare vliegtuigbiobrandstof, in São José dos Campos (Brasilië).

Dr Riaan den Haan het 'n referaat gelewer oor sellulolitiese gis by die 34ste simposium oor biotegnologie vir brandstof en chemikalieë in New Orleans, Louisiana (VSA).

Me Kim Trollope van dr Heinrich Vol-schenk se laboratorium het 'n plakkaat aangebied by die 6de internasionale kongres oor biokatalise (Biocat2012) in Hamburg (Duitsland). Op sy beurt het mnr Ferdinand Postma van prof Alf Botha se laboratorium 'n plakkaat aangebied by die 7de kongres van die Internasionale Simbiosevereniging in Krakow (Pole).

Kontakinligting

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Akademie sake

Nadat die Departement Mikrobiologie in 2011 sy 50ste bestaansjaar gevier het, het die departement sy vere reggeskud en 'n selfbeoordelingsproses onderneem, wat 'n geleentheid vir selfondersoek en toekomsbeplanning gebied het. Die uiteindelige verslag, wat met behulp van eksterne moderators opgestel is, het klem gelê op die departement se goeie navorsingsprofiel en hoë voorgraadse suksessyfers wat ondersteun word deur 'n sterk personeelkomponent met 'n kenmerkende gees van kollegialiteit en onderlinge ondersteuning. Groot uitdagings waarvoor die departement te staan kom, sluit in die stygende voorgraadse studentegetalle, 'n afname in PhD-studente, en volhoubaarheidskewessies met betrekking tot wisselvallige eksterne finansiering om navorsing te ondersteun en verouderde toerusting in stand te hou en te vervang.

Dosente handhaaf 'n hoë onderrigstandaard in alle voorgraadse kursusse en het 'n gemiddelde indrukspunt van 77% behaal. Onderriginhoud word voortdurend bygewerk om op hoogte van die jongste ontwikkelings op die gebied van mikrobiologie te bly en om kursushoud prakties op werklike voorbeelde toe te pas. Baie studente bevestig dan ook dat juis dit onderrig relevant maak. Tog bly die immer stygende voorgraadse studentegetalle en swak toegeruste skoolverlaters beduidende struikelblokke vir onderrig van gehalte.

Die departement het in 2012 aan 'n programwye kurrikulumhershikking deelgeneem om die twee hoofvak-model weer op derdejaarsvlak bekend te stel. Die gevolglike veranderinge aan die kurrikulum, wat gedurende 2014 ingefaseer sal word, sal finalejaaronderrig in mikrobiologie verdiep met vier volledige modules wat oor twee semesters versprei is, en sal studente beter toerus vir 'n nagraadse kwalifikasie.

Die departement het steeds 'n groot getal nagraadse studente (11 honneurs-, 23 magister- en 10 PhD-studente) in verhouding tot die getal akademiese personelede. Ons dosente publiseer getrou hul navorsingsresultate wat gelei het tot sowat drie artikels per dosent.

Diens aan die wetenskaplike gemeenskap

Prof Leon Dicks dien in die redaksionele raad van die vaktydskrifte *International Journal of Food Microbiology* (sedert 1999), *Journal of Applied Microbiology* (2005-2012), *Letters in Applied Microbiology* (2005-2012), *Probiotics and Antimicrobial Proteins* (sedert 2008), *Beneficial*

Microbes (sedert 2008) en *Bioscience of Microbiota, Food and Health* (sedert 2011). Hy is ook hoofredakteur van die *South African Journal of Enology and Viticulture*.

Prof Karin Jacobs dien as ondervoorsitter van die Mikologiese Vereniging van Afrika, en is ook in die redaksionele raad van die vaktydskrif *Mycology*.

Prof Alf Botha is tot lid van die Wetenskap-akademie van Suid-Afrika verkies, en sluit hom daarmee by medeleders proff Doug Rawlings, Bernard Prior, Emile van Zyl en Leon Dicks – almal van die Departement Mikrobiologie – aan. Prof Botha dien ook in die redaksionele raad van die *Canadian Journal of Microbiology* en *FEMS Yeast Research*, en is 'n lid van die Materiaalnavorsingsgroep se gebruikersadvieskomitee by iThemba LABS.

Prof Emile van Zyl is steeds lid van die adviesraad van die Bioimprove-program in Swede, en dr Heinrich Volschenk dien as raadslid van die Suid-Afrikaanse Vereniging vir Mikrobiologie.

Toekennings aan personeel en studente

Prof Leon Dicks se baanbrekersnavorsing oor melksuurbakterieë het hom die gesogte TW Kambule-prys by die prysuitdeling van die Nasionale Wetenskap- en Tegnologieseforum en BHP Billiton besorg.

Prof Emile van Zyl was naaswenner van die Suid-Afrikaanse Nasionale Energievereniging se energieprys vir 2012. Prof Alf Botha en mede-outeurs het die Douw Greeff-prys ontvang vir die beste referaat wat in 2011 in die *Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie* verskyn het. Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns ken jaarliks hierdie prys vir 'n navorsings- of ondersoekende artikel van uitstekende wetenskaplike gehalte toe.

Personeelsake

Prof Emile van Zyl het die vyfde voorsitter van die Departement Mikrobiologie geword terwyl prof Doug Rawlings vir ses maande as Viserektor (Navorsing) waargeneem het. Met die verkiesing van prof Eugene Cloete, voormalige Dekaan van die Fakulteit Natuurwetenskappe en ook lid van die departement, tot die nuwe Viserektor (Navorsing en Innovasie), het prof Rawlings die pos van waarnemende Dekaan van die Fakulteit Natuurwetenskappe aanvaar.

Gemeenskapsdiens

Prof Emile van Zyl, bekleër van die senior leerstoel oor biobrandstowwe, het ver-

skeie wetenskaplike en informele seminare aangebied, onder meer 'n voorlegging aan U3A Helderberg oor die geleentheid en uitdagings van volhoubare biobrandstofproduksie in Suider-Afrika. U3A staan vir "University of the Third Age" en is 'n wêreldwye netwerk leergemeenskappe vir ouer mense.

Die departement het aan inisiatiewe by die Kleinmond-behuisingsprojek deelgeneem om kennis oor die gehalte van opgevangre reënwater in Suid-Afrika uit te brei. Die Kleinmond-behuisingsprojek is die geesteskind van die Wetenskaplike Nywerheid- en Navorsingsraad (WNNR) en die Departement van Wetenskap en Tegnologie (DWT). Met finansiering van die Waternavorsingskommissie, het me Penelope Dobrowsky en drr Michele de Kwaadsteniet en Wesaal Khan onder leiding van prof Eugene Cloete bevind dat, hoewel die chemikalie-inhoud van die reënwater oor die algemeen laer was as die maksimum voorgeskrewe perke vir drinkwater; die water in huishoudelike reënwaterentks volgens die mikrobiiese ontleding nie vir drinkwater- en sekere huishoudelike doeleindes gebruik behoort te word nie. Me Dominique Mannel van die Departement Sosiologie, wat ook as navorsingsassistent by die US Waterinstituut werk, het op haar beurt met 68 huishoudings in die Kleinmond-behuisingsprojek onderhoude gevoer om ondersoek in te stel na hul aanvaarding van, en opvattinge oor, die gebruik van huishoudelike reënwaterentks. Navorsing duur voort om die mikrobiiese gehalte van opgevangre reënwater aan drinkwaterstandaarde te laat voldoen deur behandelingstegnologieë soos filtreer- of sonontsmettingstelsels in werking te stel daar waar die water gebruik word.

MSc-student me Veronique Meyer het leerders by haar voormalige hoërskool, Lückhoff Sekondêre Skool op Stellenbosch, bygestaan om praktiese ervaring in watertoetsing op te doen.

Dr Michele de Kwaadsteniet en me Louisa van der Westhuizen het as streeksbeoordeelaars by die Eskom Ekspo vir Jong Wetenskaplikes van 2012 gedien, terwyl me Jenade Lynch en dr Wesaal Khan tegniesse bystand gebied het aan leerders wat vir hierdie geleentheid voorberei het.

Drr Wesaal Khan en Heinrich Volschenk het die departement se betrokkenheid by opedae van die Universiteit, die Maties Natuurwetenskappe Winterweek en ander ad hoc-besoeke deur hoërskoolleerders gekoördineer. Hierdie goed gekoördineerde interaksies het leerders se belangstelling in mikrobiologie verhoog en is deels verantwoordelik vir die toename in inskrywings die afgelope paar jaar.

US-wetenskaplikes ontwerp hoëtegnologiesfilter vir skoner water

Toe mikrobioloog **prof Eugene Cloete** in Januarie 2009 die Dekaan van die Fakulteit Natuurwetenskappe aan die Universiteit Stellenbosch (US) geword het, het hy nie toegelaat dat sy uitgebreide administratiewe pligte sy passie vir die wetenskap oorheers nie.

Inteendeel, sy blootstelling aan toepaslike navorsing buite sy eie spesialisgebied het gelei tot die uitvinding van 'n hoëtegnologie wegdoenbare filter wat soos 'n teesakkie lyk en besoedelde water suiwer.

Hy het in 2012 saam met navorsers van die Departement Mikrobiologie en US se polimeerwetenskaplikes dié innoverende uitvindsel gepatenteer. Dit is 'n gebruik- en omgewingsvriendelike watersuiweringstelsel wat in die nek van 'n bottel pas.

“Die water word gesuiwer net daar waar jy dit uit die bottel drink,” verduidelik Cloete.

Die sakkie kombineer jare se fundamentele navorsing in watersuiwering, nanotegnologie en voedselmikrobiologie op 'n praktiese wyse. Dit beloof om maklike toegang tot skoon drinkwater aan kwesbare gemeenskappe te bied, byvoorbeeld dié wat naby besoedelde waterstrome woon.

Prof Cloete, voorsitter van die US Waterinstituut, vertel dat hy die idee vir die filter tydens 'n bekendstellingsbesoek aan InnovUS, die Universiteit se tegnologie-oordragmaatskappy, gekry het.

“Ek het gekyk na die elektrospintegniek wat dr Eugene Smit van die Departement Chemie en Polimeerwetenskap ontwikkel het en waarmee ultradun vesels op 'n nanoskaal gespin word,” onthou hy.

'n Navorsingspan is saamgestel en ná verskeie proeflopies en eksperimente is 'n filtersakkie ontwikkel wat nie alleen soos 'n teesakkie lyk nie, maar ook gemaak is van bioafbreekbare materiaal soos dié van gewone rooibosteesakkies.

Die Universiteit Stellenbosch Waterinstituut en sy “teesakkie”-filter maak deel uit van die US se HOOP Projek, 'n stel ontwikkelingsdoelwitte wat daarop gemik is om lewensgehalte in Suid-Afrika en op die res van die vasteland te verbeter.

Samewerking

SUID-AFRIKA

Kaapse Skiereiland Universiteit van Tegnologie
Landbounavorsingsraad, Nietvoorbij
Mediese Navorsingsraad
Polytechnic van Namibië
Rhodes Universiteit
Universiteit van die Wes-Kaap
Waternavorsingskommissie
Wetenskaplike en Nywerheidsnavorsingsraad

INTERNASIONAAL

Chili

Andrés Bello University

Duitsland

Karlsruhe Instituut van Tegnologie

Frankryk

Muséum National d'Histoire Naturelle

Finland

Universiteit van Turku

Italië

Universiteit van Padova
Universiteit van Verona

Japan

Kyushu Universiteit
Tokio Universiteit van Landbou
Universiteit van Tokio

Nederland

Centraal Bureau voor Schimmelcultures

Swede

Umeå Universiteit

Verenigde State van Amerika

Dartmouth Kollege
Rutgers, Staatuniversiteit van New Jersey

Wallis

Bangor Universiteit

Befondsing

Agentskap vir Tegnologiese Innovasie
Cipla Medpro
Departement van Wetenskap en Tegnologie
Mascoma Corporation
Nasionale Navorsingstigting
Polytechnic van Namibië
Program vir Tegnologie en Menslike Hulpbronne vir die Nywerheid (THRIP)
RAPS GmbH & Co
Sloan Trust
Suid-Afrikaanse Nasionale Instituut vir Energie-navorsing (SANERI)
Waternavorsingskommissie

Personeel

Doserend

Prof WH van Zyl (*departementele voorsitter*)
Prof M Bloom
Prof A Botha
Prof TE Cloete (*viserektor: navorsing & innovasie*)
Prof LMT Dicks
Prof K Jacobs
T Jansen
Dr W Kahn
Prof DE Rawlings (*waarnemende dekaan*)
Dr H Volschenk

Buitengewone professore

Prof B Axcell
Prof L Lynd
Prof BA Prior
Prof J Thevelein
Prof D Toerien

Ondersteuningspersoneel

L J Daniels
M Gey van Pittius
MH Koopman
J Lynch
LA Malherbe
R Robyn
M Stuurman
T van der Merwe
L van der Westhuizen
W Wentzel

Navorsers met NNS-graderings

Toonaangewende internasionale navorser

Prof Doug Rawlings
(*molekulêre biologie van bio-ontginningsbakterieë en hul plasmiede*)

Internasionaal erkende navorser

Prof Alf Botha
(*mikrobiële ekologie*)
Prof Eugene Cloete
(*waterbiotegnologie*)
Prof Leon Dicks
(*melksuurbakterieë, probiotika en bakteriosiene*)
Prof Emile van Zyl
(*bio-etanol uit plantmateriaal en produksie van proteïene in gis en fungi*)

Gevestigde navorser

Prof Marinda Bloom
(*swambioprosessering*)
Prof Karin Jacobs
(*mikrobiële ekologie*)
Dr Heinrich Volschenk
(*bioprospektering vir ensieme en produksie van proteïene in gis*)



Departement **Plant- en Dierkunde**

Die kewermadeliefie (*Gorteria diffusa*) kom algemeen in die suide van Namibië, Namakwaland en die Klein-Karoo voor. Wat dié madelifiespesie merkwaardig maak, is dat 'n mens tot 14 verskillende blomvorms of 'blomtipes' daarvan aantref. Die tipes wissel in kleur, van helderoranje tot liggeel, met verskillende insekagtige swart kolle op. Navorsers van die Departement Plant- en Dierkunde wat die wisselwerking tussen bestuiwers en plante in die Kaapse planteryk bestudeer, het gevind dat die manlike en vroulike byvlieg (*Megapalpus capensis*) verskillende voorkeure vir hul gunsteling madelifies het. Dié navorsing is in die internasionale vaktydskrif *Functional Ecology* gepubliseer.

Foto: Dr Marinus de Jager en Ethan Newman

Departement **Plant- en Dierkunde**

Navorsingsbelange

Dierebiodiversiteit; Antarktiese en suidelike-eilandnavorsing; gedragsekologie van gewerweldiere; Kaapse flora; klimaatsverandering; gemeenskapsekologie; ekonomiese plantkunde; bewaringsgenetika en filogeografie; ekotoksikologie; ekotoksikogenomika; endokriene verstuurings; evolusionêre genomika van diere; evolusionêre fisiologie van diere; fynbos-ekologie en -genomika; herpetologie; die gebruik van inheemse en medisinale plante; insekgedrag en -fisiologie; ekofisiologie; indringer-biologie; makro-ekologie; molekulêre sistematiek; paleontologie; plant-dier wisselwerkings; plantbiodiversiteit; plantbiochemie; plantbiotegnologie; plant-ekologie; plant-ekofisiologie; plantfisiologie en -fotosintese; funksionele plantgenomika; mikorrise-swamme by plante; plantsistematiek; stres-ekologie; funksionele biologie van gewerweldiere.

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	133
Redaksionele bedrywighede (boeke en vaktydskrifte)	54
Boeke, konferensieverrigtinge, hoofstukke in boeke	14
MSc-studente in 2012 gegradueer	12
PhD-studente in 2012 gegradueer	11

Navorsingshoogtepunte

Die departementele en verwante personeel is trots daarop dat die meeste van ons navorsingsreferate in vaktydskrifte met akkreditasie by die Instituut vir Wetenskaplike Inligting (ISI) verskyn het. Lede van die Departement Plant- en Dierkunde het meer as R10 miljoen in die vorm van navorsingsfinansiering ontvang.

Meer as 70% van die akademiese personeel beskik nou oor 'n gradering van die Nasionale Navorsingstigting (NNS) (A = 3; B = 1; C = 6; Y = 9). As gevolg van die aktiewe navorsingsprogramme van die departement en die Sentrum vir Indringerbiologie (SIB), het 37 nuwe studente vir nagraadse studie in Plant- en Dierkunde geregistreer (15 honneurs, 15 MSc en sewe PhD). Ons het ook heelwat vooraanstaande nasionale en internasionale besoekers ontvang en as akademiese tuiste vir 13 nadoktorale genote van vier verskillende lande gedien.

Deur hierdie aktiewe samewerking het ons besoek ontvang van dr Robert Barclay van die Universiteit van Calgary (Kanada), prof Jaimie Dick en Mhairi Alexander van Queens Universiteit (Ierland), prof Susan Mazer van die Universiteit van Kalifornië (VSA), prof Eric Imbert van die Instituut vir Evolusionêre Wetenskap aan die Universiteit van Montpellier (Frankryk), dr Heather Whitney van die Universiteit van Bristol (VK) en dr Andrea Cosocov van die Universiteit van Cordoba (Argentinië).

Ander besoekers was onder meer dr Sara Aguado de la Paz van die Universiteit van Oviedo (Spanje), dr Michelle Greve van die Universiteit van Aarhus (Denemarke), prof Steven Karl van die Hawaise Instituut vir Mariene Biologie (VSA), dr Christine Meynard van die Sentrum vir Plantbiotegnologie en -genomika (Frankryk) en prof Michael Udvardi van die Noble-stigting in Oklahoma (VSA).

Ons seminaarprogram het met verskeie nasionale navorsingsaanbieders gespog, soos dr Woody Cotterill van AEON (die Afrika-aardwaarnemingsnetwerk), dr Lara Atkinson van SAEON (die Suid-Afrikaanse omgewingswaarnemingsnetwerk), dr Lara van Niekerk van die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) se vleiland- en nasionale biodiversiteitsasseringsprojek, mnr Saberi Marais van InnovUS, en dr Laura Blamey van die Mariene Instituut van die Universiteit van Kaapstad.

Akademiese personeel van die departement en die Sentrum vir Indringerbiologie (SIB) was teenwoordig én het navorsing aangebied by verskeie nasionale en internasionale konferensies. Internasionale bydraes sluit in dr Alex Valentine, wat die Nasionale Universiteit van Meksiko en die Noble-stigting in Oklahoma (VSA) besoek het; dr Sophie von der Heyden, wat die Nasionale Sentrum vir Evolusionêre Sintese aan Duke Universiteit (VSA) besoek het, en dr Susana Clusella-

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Trullas, wat as gasspreker opgetree het by 'n seminar van die Departement Soöfisiologie aan die Universiteit van Aarhus (Denemarke).

Dr Tammy Robinson het navorsing voorgelê by die eerste internasionale konferensie oor die regulering van indringerspesies van Suid-Afrika en Duitsland by die Justus Liebig Universiteit (Duitsland). Prof Dave Richardson en drs John Wilson en Cang Hui het 'n werksessie oor boomindringing in Bariloche (Argentinië) bygewoon, en proff Conrad Matthee en Terry Robinson het medewerkers aan die Universiteit van Montpellier (Frankryk) vir voortgesette navorsing besoek. Dr Cang Hui het ook medewerkers by CSIRO (die Statebondorganisasie vir wetenskaplike en nywerheidsnavorsing) en Monash Universiteit (Australië) besoek, terwyl prof Dave Richardson die NEOBIOTA-konferensie in Pontevedra (Spanje) bygewoon het.

Die Departement Plant- en Dierkunde is die voorkeurtuiste vir 'n aantal navorsingsgenote, wat tot navorsingsproduktiwiteit bygedra het. Dit sluit in proff Jan Nel, Eddie van Dijk, Jan Giliomee, Dan Baird, Sophie Reinecke en Koot Reinecke, sowel as drs Ted Oliver, Edmund Pool, Willie Sirgel, Krystal Tolley, John Wilson en Colin Tillbury.

Akademiese sake

Die departement is op voorgraadse vlak verantwoordelik vir ses modules in Biologie (eerste jaar) en 12 modules in Biodiversiteit en Ekologie (tweede en derde jaar). Van die eerstejaarmodules word as dienskursusse vir groot getalle studente van ander fakulteite aangebied. In dié opsig het drs Juri van den Heever, Marnel Mouton, Jaco le Roux, Sjirk Geerts en Kenneth Oberlander; mnr Marinus de Jager, Hannibal Musarurwa, Christoff Truter, Edward Archer en Bernard Coetzee, sowel as me Janine Colling en Natasha Mothapo onderrigbystand gebied.

Die hersiene program in Biodiversiteit en Ekologie is in 2012 in werking gestel. Die nuwe program sal die getal beskikbare voorgraadse modules gedurende 2013 van 18 tot 20 verhoog, en twee nuwe modules (Indringerbiologie en Bioom-ekologie) sal in 2014 as derdejaarmodules bekend gestel word. Die gewysigde program sal voor-

graadse studente meer blootstelling op die gebied van biodiversiteit en ekologie bied. Die inhoud van die voorgraadse program is bepaald ontwerp om 'n stewige platform vir nagraadse studie in Plant- en Dierkunde te bied, met die klem op biodiversiteit, evolusie en ekologie. Die nuwe derdejaarmodules vir 2013 sluit in 'n veldkursus in Ekologie, Angiospermdiversiteit en -evolusie, Wêreldwyeveranderingsbiologie, Evolusionêre Ekologie, Evolusionêre Patrone en Prosesse, en Bewaringsbiologie.

Die departement het voortgegaan met die interaktiewe tutoriaalstelsel vir klein groepe eerstejaarstudente met verskillende bevoegdheidsvlakke. Volgens hierdie stelsel bied 11 toegewyde nagraadse studente een maal per week bykomende onderrig in die vorm van formele tutoriaalklasse. Dieselfde tutors is beskikbaar vir gereelde konsultasies met individuele studente. Die program, wat deur prof Theresa Wossler gekoördineer word, blyk uiters suksesvol te wees. Ondanks die groter klasgroottes, het eerstejaars se slaagsyfer in die meeste kursusse beduidend toegeneem sedert die program bekend gestel is.

Sewe-en-dertig nagraadse studente het hul grade suksesvol in die departement verwerf (14 honneurs, 12 MSc en 11 PhD). Tans is 39 magister- en 33 PhD-studente in die departement geregistreer. Vyftien MSc- en ses PhD-studente het in 2012 hul projekvoorstelle met welslae voorgelê. Die akademiese komitees van die departement het drie voorstelle vir die opgradering van MSc-studie na PhD-studie beoordeel en goedgekeur.

Diens aan die wetenskaplike gemeenskap

Verskeie personeellede het as eksterne eksamineerders vir kursusse opgetree of in adviespanele vir verskillende bewarings- en staatsliggame gedien.

Die personeellede van die Departement Plant- en Dierkunde wat as eksterne eksamineerders opgetree het, sluit in dr Carol Simon (Kaapse Skiereilandse Universiteit van Tegnologie), dr Nokwanda Makunga (universiteite van die Vrystaat en Kaapstad), prof Le Fras Mouton (universiteite van die Vrystaat en die Wes-Kaap), prof Theresa Wossler (Rhodes Universiteit), prof Hannes van Wyk (universiteite van die Wes-Kaap en Kaapstad), dr Alex Flemming (universiteite van die Wes-Kaap en Kaapstad) en prof Valdon Smith (Universiteit van die Wes-Kaap).

Prof Michael Cherry het as paneellid van die Nasionale Navorsingstigting (NNS) vir

die toekenning van toelae in Dierkunde en Ekologie gedien, en ook as 'n trustee vir die Kalahari Navorsingstrust. Dr Allan Ellis het as raadsekretaris van die Suid-Afrikaanse Genootskap van Plantkundiges (SAGP) gedien en oor twee NNS-interns toesig gehou. Dr Carol Simon het as konsultant opgetree vir 'n perlemoenplaas, en as verteenwoordiger in die Internasionale Vereniging oor Borselwurms gedien.

Dr Nokwanda Makunga het as voorsitter van SAGP en as lid van die wetenskaplike komitee vir die Mediese Navorsingsraad se navorsingsdag gedien. Sy was ook 'n gasspreker by SciFest 2012 as deel van die Wetenskap- en Tegnologieforum se promosietoer na Grahamstad, en is genooi as lid van die afvaardiging wat die Departement van Wetenskap en Tegnologie (die inheemse kennisstelselsplatform) na Indië vergesel het. Sy is boonop die hoofnavorsor in 'n navorsingsprojek saam met Footprint Management Solutions wat deur THRIP (die program vir die ontwikkeling van tegnologie en menslike hulpbronne vir die nywerheid) gefinansier word.

Dr Alex Valentine was in die adviesraad van JS Marais-park, terwyl daar gereelde onderhoud met prof Le Fras Mouton gevoer is vir die Afrikaanse radioprogram *Hoe verklaar jy dit?* op RSG. Prof Terry Robinson het as evalueerder van die NNS opgetree, as raadslid van die Internasionale Sitemogenetika- en Genoomvereniging gedien, en was ook uitvoerende en stigtersraadslid van die Internasionale Lagomorf Vereniging. Prof Theresa Wossler was 'n aktiewe lid van die Helderberg Advieskomitee, wat die bestuurskomitee van die Helderberg Natuurreservaat in Somerset-Wes oor aangeleenthede soos brandbestuur, dierverskuiwings en openbare kwessies adviseer.

Prof Hannes van Wyk het in die programkomitee vir die internasionale Berlyn 10-konferensie, die reëlingskomitee van die internasionale simposium oor toksisiteits-assessering, sowel as die bestuurskomitee van die Waternavorsingskommissie gedien. Hy was ook 'n lid van die beoordelaars-paneel vir die Junior Kaptein Scott-medalje. Prof Conrad Matthee was 'n lid van die bestuurskomitee van die Trust vir Bedreigde Natuurlewe se werksgroep oor oewerkonynne. Dr Anton Pauw het as trustee van die Veldblombewaringstrust en as 'n lid van die Red Hill Bewaringsgroep gedien, en is ook om bydraes vir die BBC-reeks *Wonders of Life* genader. Dr Sophie von der Heyden se boek *Southern African Sea Life – A Guide for Young Explorers* is deur STRUIK uitgegee.

Prof Leanne Dreyer het as wetenskapskon-

Foto: Engela Duvenage



Hier wys S•I•B tegniese beampte Thembile Khoza vir Minister Naledi Pandor van die miere wat al ingesamel is as deel van die limbavane Uitreikprogram.

Minister van Wetenskap en Tegnologie besoek S•I•B

Met haar besoek aan die Universiteit Stellenbosch-kampus op 21 Februarie 2012 het die Minister van Wetenskap en Tegnologie, me Naledi Pandor, 'n indrukwekkende oorsig van die werksaamhede en projekte van die DWT-NNS Sentrum van Uitnemendheid vir Indringerbiologie (S•I•B) ontvang.

Die Minister is vergesel deur dr Albert van Jaarsveld, Voorsitter en Uitvoerende Hoof; Nasionale Navorsingstigting (NNS), en ander sleutelamptenare van die NNS. Hulle is ontvang deur US se Rektor, prof Russel Botman; die US se waarnemende Viserektor (Navorsing), prof Douglas Rawlings; die Dekaan van die Fakulteit Natuurwetenskappe, prof Eugene Cloete, en personeellede van die S•I•B.

Die S•I•B is een van sewe Sentrums van Uitnemendheid wat die Departement van Wetenskap en Tegnologie (DWT) en die NNS sedert 2004 tot stand gebring het. Lede van dié sentra onderneem navorsing oor die impak van indringerspesies op biodiversiteit en ekologiese dienste soos watervoorsiening.

Indringerspesies is organismes wat per abuis of doelbewus na buite hul oorspronklike tuistes versprei het en nou biodiversiteits- en/ of ekonomiese skade aanrig. Die ekonomiese koste van die impak van indringerspesies word op 5% van die wêreldwye bruto binnelandse produk (BBP) geraam.

sultant vir die *Woordeboek van die Afrikaanse Taal* (WAT) en as lid van die DWT-NNS Sentrum van Uitnemendheid in Boomgesondheidsbiotegnologie gedien. Prof Savel Daniels was 'n lid van die NNS se nadoktorale keuringspaneel, terwyl dr Victor Rambau in die komitee van die Dierkundige Vereniging van Suider-Afrika (DVSA) gedien het. Dr Tammy Robinson het in die raad gedien vir die keuring van aansoeke om finansiering uit die NNS se Thuthuka-fonds.

Personeellede was ook aktief betrokke by redaksionele bedrywighede vir etlike toonaangewende vaktydskrifte. Dit sluit in prof Michael Cherry (*Behavioral Processes; Folia Zoologica en Emu*, en hoofredakteur van *SA Journal of Science*), dr Allan Ellis (mederedakteur van die *Botanical Journal of the Linnaen Society*), dr Carol Simon (redakteur van die nuusbrieff van die DVSA), dr Makwanda Makunga (mederedakteur van die *Suid-Afrikaanse Tydskrif vir Plantkunde*), dr Alex Valentine (*African Journal of Herpetology* en mederedakteur van *African Zoology*), prof Terry Robinson (*Chromosome Research, Cytogenetics and Genome Research en Heredity*, en mederedakteur saam met dr F Yang van 'n spesiale uitgawe van *Heredity* getiteld "Molecular Cytogenetics: Karotype evolution, phylogenomics and future prospects"), prof Theresa Wossler (assistent-redakteur van *African Entomology*), prof Hannes van Wyk (redakteur van *African Zoology*), prof Conrad Matthee (*Integrative and Comparative Biology; Koedoe en African Journal of Marine Science*), dr Anton Pauw (vakredakteur vir die *Suid-Afrikaanse Tydskrif vir Plantkunde*), dr Susana Clusella-Trullas (*Journal of Thermal Biology; Frontiers in Invertebrate Physiology en Austral Ecology*), dr Cang Hui (*Biological Invasions; Applied Mathematical and Computational Sciences; The Open Zoology Journal en The Scientific World Journal*), dr Jaco le Roux (keurderspaneel vir *Czech Science* en mederedakteur van *Biological Invasions*) en prof Valdon Smith (*Polar Record*).

Verskeie personeellede neem aktief deel aan die organisatoriese of besluitnemingstrukture van 'n aantal diensorganisasies. Dit sluit in SAGP; die Landbounavorsingsraad (LNR); die taakspan vir die ontwikkeling en regulering van uitheemse spesies ingevolge die Suid-Afrikaanse Wet op Biodiversiteit; SCAR, oftewel die wetenskaplike komitee oor Antarktiese navorsing; die DVSA; die Suid-Afrikaanse Raad op Natuurwetenskaplike Beroepe; die Suid-Afrikaanse Nasionale Biodiversiteitsinstituut (SANBI); die NNS-biodiversiteitsfokuspaneel; die raad van die Suid-Afrikaanse Vereniging vir Sistematiese Biologie; die Inligtingsfasiliteit vir Wêreld-

wye Biodiversiteit; die spesialisgroep oor lagomorfe; die veeartsenykundige navorsingsinstituut by Onderstepoort; die Kalahari Navorsingstrust; die bestuurskomitee van die Werksgroep oor Oewerkonynne; die bestuurskomitee van die Waternavorsingskommissie; die Junior Kaptein Scott-paneel van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, en SARCA, oftewel die Suider-Afrikaanse Reptielbewarings-assesseringsprojek.

Van die internasionale diensorganisasies met wie die departement bande het, sluit in die Australiese Antarktiese Afdeling, die Nederlandse Organisasie vir Wetenskaplike Onderzoek (NWO), die Komitee vir Navorsing en Verkenning van die *National Geographic*-vereniging van die VSA, die Internasionale Unie vir Natuurbewaring (IUCN), die amfibieë-spesialisgroep van die Europese Unie se Organisasie vir Ekonomiese Samewerking en Ontwikkeling (OECD), die Nasionale Omgewings-navorsingsraad van die Verenigde Koninkryk, en die Nederlandse Instituut vir Ekologiese Navorsing.

Toekennings aan personeel en studente

Verskeie van ons personeellede is vir hul werk vereer. Dr Bruce Anderson het 'n Oppenheimer-beurs ontvang en 'n navorsingsjaar in Japan deurgebring. Prof Savel Daniels het 'n Oppenheimer- en 'n Fulbright-beurs vir sy navorsingsbesoek aan Harvard Universiteit ontvang.

Prof Terry Robinson het hoë lof verwerf vir sy rol in die samestelling van die omvattendste stamboom vir soogdiere tot dusver, wat in Januarie 2012 in die toonaangewende vaktydskrif *Science* verskyn het. Prof Michael Cherry is tot lid van ASSAF, die Wetenskap-akademie van Suid-Afrika, en prof Theresa Wossler tot lid van die Komitee vir Leer en Onderrig aan die Universiteit Stellenbosch verkies.

Ook ons studente het, in samewerking met hul studieleiers, verskeie pryse vir hul werk ontvang. Mnr Bernard Coetzee (onder leiding van prof Steven Chown) het die prys vir die beste studentevoorlegging by die 3de Europese kongres oor bewarings-ekologie gewen, terwyl me Genevieve Thompson (onder leiding van prof Dave Richardson en drs Jaco Le Roux en John Wilson) die beste PhD-aanbieding by die byeenkoms van SAGP gedoen het. Me Nina du Toit (onder leiding van prof Conrad Matthee en Bettine Jansen van Vuuren) sowel as dr Sonja Matthee) het die beste voorlegging deur 'n doktorsale student by die 10de byeenkoms van die Suider-Afri-

kaanse Vereniging vir Sistematiese Biologie gelewer. Mnr Adriaan Engelbrecht (onder leiding van dr Sonja Matthee en prof Conrad Matthee) het by dieselfde konferensie die derde prys losgeslaan. Me Natasha Mothapo (onder leiding van prof Theresa Wossler) en mnr Marinus de Jager (onder leiding van dr Allan Ellis) is uit 60 studente gekies om hul werk by die konferensie New Voices in Science 2012 by die Universiteit Stellenbosch aan te bied.

Personeelsake

Dr Jaco le Roux, 'n kundige oor molekulêre indringerbiologie, is met ingang van 1 Januarie 2012 as dosent, en dr Susana Clusella-Trullas met ingang van 1 Oktober 2012 as senior dosent aangestel. Dr Sue Jackson het afgetree as akademiese dosent, maar sit haar verbintenis met die departement as navorsingsgenoot voort. Me Judy Smith het die departement met ingang van November 2012 ná vyf jaar diens verlaat. Prof Steven Chown (professor in Plant- en Dierkunde, en direkteur van die SIB) het 'n aanstelling by Monash Universiteit, Australië, aanvaar, maar sit sy betrokkenheid by die departement as buitengewone professor voort. Prof Dave Richardson is as die nuwe direkteur van die SIB aangestel.

Gemeenskapsdiens

'n Aantal dosente was betrokke by die Maties Natuurwetenskappe Winterweek. Leerders is onder leiding van prof Leanne Dreyer bewus gemaak van die volhoubare gebruik van biodiversiteit vir kommersiële en kulturele gewin.

Die SIB se limbovane-projek is steeds uiters suksesvol met biodiversiteitsonderrig aan onderwysers en hoërskoolleerders. Hierdie uitnemende projek het selfs minister Naledi Pandor se aandag getrek toe sy die departement op 21 Februarie 2012 besoek het.

Samewerking

SUID-AFRIKA

Bedreigde Wildlewe Trust (EWT)
Bosbou en Landbou Biotechnologie Instituut (FABI)
Britse Ekologiese Vereniging
CapeNature
Departement van Omgewingsake en Toerisme
Departement van Landbou, Bosbou en Visserye
DWT/NNS Sentrum van Uitnemendheid in "Tree Health Biotechnology"
Iziko Museum van Kaapstad
Kaapse Skiereiland Universiteit van Tegnologie
Landbounavorsingsraad, Infruitec-Nietvoorbij
Landbounavorsingsraad, Pretoria
Mediese Navorsingsraad
Nelson Mandela Metropolitaanse Universiteit
Noordwes Universiteit
Plantbeskermings- en Navorsingsinstituut
Perishable Products Export Control Board (PPECB)
Rhodes Universiteit

Sasol Tegnologie
Suid-Afrikaanse Instituut vir Akwatiese Biodiversiteit
Suid-Afrikaanse Nasionale Biodiversiteitsinstituut
Suid-Afrikaanse Nasionale Parke
Universiteit van Kaapstad
Universiteit van KwaZulu-Natal
Universiteit van Pretoria
Universiteit van Venda
Universiteit van die Vrystaat
Universiteit van die Wes-Kaap
Veeartsenykunde (Onderstepoort)
Werk vir Water Program
Wetenskaplike en Nywerheidsnavorsingsraad (WNNR)
WNNR Natuurlike Hulpbronne en die Omgewing navorsingseenheid

INTERNASIONAAL

Argentinië

Universiteit van Cordoba
Universiteit van Rio Cuarto

Australië

Australiese Antarktiese Afdeling
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Curtin Universiteit van Tegnologie
Departement van Omgewingsake en Bewaring, Wes Australië
James Cook Universiteit
Kings Park en Botaniese Tuin
Macquarie Universiteit
Sentrum vir Evolusionêre Biologie en Biodiversiteit, Australiese Nasionale Universiteit
Universiteit van Adelaide (insluitend ACEBB, School of Earth and Environmental Sciences)
Universiteit van Melbourne
Universiteit van Nieu Suid-Wallis
Universiteit van Queensland
Universiteit van Sydney
Universiteit van Wes-Australië (insluitend School of Plant Biology)

België

Flanders Instituut vir Biotechnologie, Universiteit van Ghent

Brasilië

Universidade Federal de Santa Catarina

China

Guandong Universiteit van Tegnologie
Hefei Universiteit van Tegnologie
Lanzhou Universiteit

Denemarke

Universiteit van Kopenhagen
Universiteit van Aarhus

Duitsland

Alfred Wegener Institute for Polar and Marine Research
Universiteit van Braunschweig
Universiteit van Freiburg
Universiteit van Hamburg
Universiteit van Leipzig
Universiteit van Wurzburg

Finland

Universiteit van Jyväskylä

Frankryk

Centre de Biologie et Gestion des Populations, Université Montpellier 2
Campus de Baillarguet, Montferrier sur Lez, Montpellier
Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier



Prof Dave Richardson het ook die John FW Herschel-medalje van die Koninklike Vereniging van Suid-Afrika ontvang.

Indringerbioloog aangestel as reisende professor

Prof Dave Richardson, Direkteur: Sentrum vir Indringerbiologie (SIB) aan die Universiteit Stellenbosch (US), is aangestel as 'n James March-reisende professor aan die Universiteit van Vermont (UV), een van Amerikaanse voorste klein navorsingsunivereiteite.

Gedurende 2012 het Prof Richardson ook die John FW Herschel-medalje van die Koninklike Vereniging van Suid-Afrika ontvang.

Prof Richardson bestudeer die dinamiek van plantindringing en is 'n internasionale deskundige op die gebied van indringerbome en -struik. Baie van sy werk is daarop afgestem om praktiese riglyne vir die beter bestuur van indringerspesies te bied, maar hy dra ook tot teoretiese raamwerke en algemene modelle by vir 'n grondige begrip van indringingsdinamiek.

Sy aanstelling by die UV is vir sewe jaar, waartydens hierdie A-gegradeerde wetenskaplike Burlington vir tot vier resident-tydperke van etlike weke elk sal besoek.

Maties kry pryse vir parasietstudies

Twee doktors studente van die Universiteit Stellenbosch – albei met ’n besondere voorliefde vir die studie van parasiete – was onder die prysweners na afloop van die 10de kongres van die Suid-Afrikaanse Vereniging vir Sistematiese Biologie (SASSB) in Arniston. **Me Nina du Toit** het die beste praatjie deur ’n doktors student gelewer, terwyl **mnr Adrian Engelbrecht** die derde plek in hierdie kategorie ingeneem het.

SASSB het ten doel om sistematiek en taksonomie in Suid-Afrika te bevorder en is multidisiplinêr van aard.

Die twee studente deel dieselfde studieleiers – **prof Conrad Matthee**, uitvoerende hoof van die Departement Plant- en Dierkunde wie se navorsingsprogram fokus op molekulêre sistematiek en bevolkingsgenetika, en **dr Sonja Matthee** van die Departement Bewaringsekologie en Entomologie wat op haar beurt die taksonomie en ekologie van parasiete na die tafel bring.

Me Du Toit is besig met ’n uitgebreide filogeografiese studie oor die gestreepte veldmuis (*Rhabdomys pumilio*) en fokus veral ook op die parasitiese luis (*Polyplax arvicantis*) wat net op dié knaagdier voorkom.

Mnr Engelbrecht se navorsing fokus op ’n parasitiese myt, *Laelaps giganteus*, wat vermoedelik op verskeie soorte klein knaagdiere in Suid-Afrika voorkom.

Aangesien daar nie tans werklik duidelikheid is oor hoe gasheerspesifiek *Laelaps giganteus* werklik is nie, behoort sy studie onder andere meer konkrete bewyse hieroor te kan lewer

Volgens *Dr Matthee* is bitter min navorsing nog gedoen oor die genetiese verspreiding van sekere van Afrika se parasietpesies.

Franse Pool Instituut
Institut des Sciences de l'Evolution, Université Montpellier II
Institut National de l'Environnement Industriel et des Risques (INERIS)
Musée National d'Histoire Naturelle
National Centre for Scientific Research (CNRS)
Universiteit van Montpellier
Universiteit van Franche-Comte
Universiteit van Paul Sabatier, Toulouse

Griekeland
Athene Landbou Universiteit

Hongarye
Hongaarse Akademie vir Wetenskappe

Indië
Indiese Instituut vir Wetenskap, Bangalore

Iran
Tarbiat Modares Universiteit

Italië
Universiteit van Bologna
Universiteit van Siena

Japan
Kyoto Universiteit
Nasionale Biologie-instituut, Okazaki

Kanada
Simon Frazer Universiteit
Universiteit van Toronto

Kenya
Universiteit van Nairobi

Mexico
Nasionale Universiteit van Mexico

Nederland
Data-Analyse Ecologie
Wageningen Universiteit

Nieu-Seeland
Universiteit van Auckland

Noorweë
Universiteit van Oslo

Pole
Universiteit van Jagelonië

Portugal
Instituto Superior de Psicologia Aplicada (ISPA)
Universiteit van Evora
Universiteit van Lisbon

Spanje
Centre Tecnològic Forestal de Catalunya
Doñana Biological Station
National Museum of Natural Sciences
Universitat de Autònoma de Barcelona
Universidad de Girona
Universidad de Pablo de Olavida
Universidad de Oviedo
Universidad de Valencia

Swede
Stockholm Universiteit
Sweedse Landbou Universiteit
Universiteit van Lund

Switserland
Universiteit van Zürich

Tsjeggiese Republiek
Botaniese Instituut
Charles Universiteit
Tsjeggiese Akademie van die Wetenskappe
Veeartsenykunde Navorsingstituut, Brno

Verenigde Koninkryk
Britse Antarktiese Opname
Britse Trust vir Ornitologie
Cambridge Universiteit
Koninklike Botaniese Tuin Kew
Natuur-historiese Museum
Plymouth Mariene Laboratorium
Queen Mary Kollege, Universiteit van London
Universiteit van Bristol
Universiteit van Exeter
Universiteit van Sheffield
Wellcome Trust Sanger Instituut

Verenigde State van Amerika
Cornell Universiteit
Field Museum Chicago
The Noble Foundation
Universiteit van Suid-Georgië
Universiteit van Kalifornië Berkeley
Universiteit van Kalifornië Davis
Universiteit van Kalifornië Santa Cruz
Universiteit van Vermont
Universiteit van Villanova
Universiteit van Wisconsin (Madison)
Wes-Virginia Universiteit

Befondsing

Centre National de la Recherche Scientifique (CNRS)
Claude Leon Stigting
Departement van Landbou, Bosbou en Visserye
Departement van Wetenskap en Tegnologie
Duitse Akademiese Uitrui diens (DAAD)
Ernst Oppenheimer Fellowship Trustfonds
John Ellerman Stigting
Kaapse Luiperd Trust
Nasionale Geografie Vereniging van Amerika
Nasionale Navorsingstigting (NNS)
Nasionale Natuurwetenskap Trust van China (NSFC)
Oppenheimer Gedenkruis
Royal Society, Verenigde Koninkryk
Sasol Tegnologie
Sitrus Navorsing Internasionaal
Suid-Afrikaanse Instituut vir Biodiversiteit
Suid-Afrikaanse Nasionale Antarktiese Program
Tafelberg Fonds
Thuthuka
Universiteit Stellenbosch
Waternavorsingskommissie
Wetenskaplike en Nywerheidsnavorsingsraad
Werk vir Water Program

Personeel

Doserend

Prof CA Matthee (*uitvoerende hoof*)
 Dr BC Anderson
 Prof MI Cherry
 Prof SL Chown
 Dr S Clusella-Trullas
 Prof SR Daniels
 Prof LL Dreyer
 Dr AG Ellis
 Dr AF Flemming
 Dr S Jackson
 Prof B Jansen van Vuuren
 Dr JJ Le Roux
 Dr NP Makunga
 Prof PLN Mouton
 Dr CA Pauw
 Dr RV Rambau
 Prof SA Reinecke
 Prof DM Richardson
 Dr TB Robinson
 Prof TJ Robinson
 Dr CA Simon
 Prof VR Smith
 Dr AJ Valentine
 Prof JH van Wyk
 Dr S von der Heyden
 Prof TC Wossler

Sentrum van Uitnemendheid vir Indringerbiologie

Prof SL Chown (*direkteur tot Mei 2012*)
 Prof DM Richardson (*direkteur*)
 Dr C Hui

Buitengewone professore

Prof S Barrett
 Prof AM Bauer
 Prof SL Chown
 Prof MA McGeogh
 Prof KJ Gaston
 Prof MA McGeogh
 Prof L Mumba

Ondersteuningspersoneel

L Willems (*eerste sekretaresse*)
 JL Basson
 A Fransman
 F Gordon
 RM Honing
 S Johnson
 DJD Julies
 A Kleinert
 R Robertson
 MP Sauerman
 M Siebritz
 JN Smith

N Solomons
 RC Thompson
 JP Williams
 H Witbooi

Sentrum van Uitnemendheid vir Indringerbiologie

K Coombe-Davis
 S Davis
 M de Morney
 D du Plessis
 M Gaertner
 A Garthwaite
 K Jumbam
 T Khoza
 S Kritzinger-Klopper
 E Marais
 C Momberg
 E Nortje
 C Scheepers
 D Scott
 M van der Vyver

Navorsers met NNS-graderings

Toonaangewende internasionale navorser

Prof Steven Chown
(indringerbiologie en evolusionêre fisiologie)

Prof Dave Richardson
(indringerbiologie en bewaringsbiogeografie)

Prof Terry Robinson
(evolusionêre genomika en filogenomika van soogdiere)

Internasionaal erkende navorser

Prof Valdon Smith
(Antarktika en Suidelike-eiland biologie en ekologie)

Gevestigde navorser

Prof Mike Cherry
(gedragsekologie)

Prof Leanne Dreyer
(evolusie van die Kaapse flora)

Prof Conrad Matthee
(molekulêre sistematiek en filogeografie)

Prof Le Fras Mouton
(evolusionêre ekologie van akkedisse)

Dr Alexander Valentine
(molekulêre fisiologie van gasheer-mikrobe interaksies van peuldraende plante in fosfor-arme grond)



John Cooper (middel) saam met Mark Anderson, Birdlife SA se hoof-uitvoerende beampte, en Vernon Head, voorsitter van Birdlife SA.

Foto: Lesley Clemens

Birdlife SA vereer seevoëlkenner

Die gesoute ornitoloog **John Cooper**, 'n navorsingsgenoot van die Universiteit Stellenbosch (US), het die eerste plaaslike seevoëlkenner geword om die gesogte Gill-gedenkmedalje van Birdlife Suid-Afrika te ontvang.

Dit is die tweede prys wat mnr Cooper vanjaar ontvang ter erkenning van sy toegewyde navorsing oor, en bewaring van, seevoëls soos albatrosse en stormvoëls die afgelope vier dekades. Mnr Cooper is 'n navorsingsgenoot by die US se DWT-NNS Sentrum van Uitnemendheid vir Indringerbiologie.

Dit is maar die 18de keer sedert 1960 wat die gegraveerde brons medalje toegeken word, en die heel eerste keer wat dit 'n ornitoloog vereer wat sy loopbaan aan die studie van seevoëls gewy het. Die Gill-gedenkmedalje, die mees gesogte prys van Birdlife Suid-Afrika, erken 'n amateur óf professionele persoon se uitnemende lewenslange bydrae tot die kennisbasis oor Suider-Afrikaanse voëls.

Birdlife Suid-Afrika se missie is om die genot, bewaring, studie en begrip van wilde voëls en hul habitats te bevorder.

Foto: Engela Duvenage



Dr Sophie von der Heyden

Mariene bioloog skryf boek oor seelewe vir kinders

Het jy geweet 'n seester druk sy maag deur sy mond en plaas dit direk oor sy prooi om te vreet? Of dat seekatte nogal slim is? Of dat Columbus-krappe hemelsblou is?

Dr Sophie von der Heyden, 'n mariene bioloog verbonde aan die Departement Plant- en Dierkunde, het 'n mariene gids met dié en ander interessante feite in vir kinders tussen agt en veertien jaar geskryf. *Southern African Sea Life: A Guide for Young Explorers*, word deur Struik Natuur uitgegee en is sedert November 2012 in boekwinkels te kry.

Die gids bied 'n oorsig van Suider-Afrikaanse seestrome, die belang en bewaring van die see, sowel as verskeie mariene habitats. Seeplante en -diere, soos seegrasse, molluske, visse, strandvoëls en mariene soogdiere en reptiele, word met behulp van maklik verstaanbare teks en lewensgetroue kleurfoto's bespreek.

Die gerekende mariene fotograaf **Guido Zsilavec** van SURG, die Suidelike Onderwatnavorsingsgroep, het die meeste van die foto's bygedra wat gebruik is om die eiening van spesies te vergemaklik. Illustrasies deur **Sally McLarty**, 'n gesoute illustreerder van kinder- en natuurboeke, is ook ingesluit.

Die boek sluit ook 'n vakansiegids in wat konsentreer op die verskillende gewilde dele van die Suider-Afrikaanse kuslyn, onder meer die Weskus, die Wildekus, Namibië en Mosambiek, en bied 'n oorsig van die seelewe wat besoekers waarskynlik in elk van hierdie kusstroke sal teëkom.

Prof Theresa Wossler
(kommunikasie en sosiale organisasie van hymenopters)

Belowende jong navorser

Dr Bruce Anderson
(plant-dier interaksie)

Prof Savel Daniels
(molekulêre sistematiek, filogeografie en bewaring van invertebrata)

Dr Susana Clusella-Trullas
(termiese aanpassing van koudbloedige reptiele en implikasies vir klimaatsverandering)

Dr Allan Ellis
(evolusionêre ekologie van plante en insekte)

Dr Nokwanda Makunga
(medisinale plant biotegnologie)

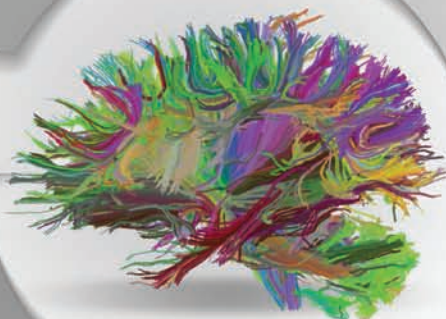
Dr Anton Pauw
(evolusionêre ekologie van plante en hul pollineerders)

Dr Victor Rambau
(sitogenetika, filogeografie)

Dr Carol Simon
(reproduksie van marine invertebrate en taksonomie van polychaete wurms)

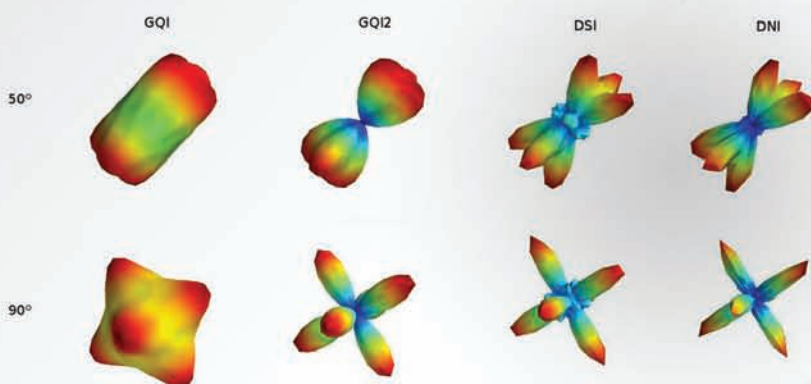
Dr Sophie von der Heyden
(marine molekulêre ekologie en bewaring)

BEELD 1



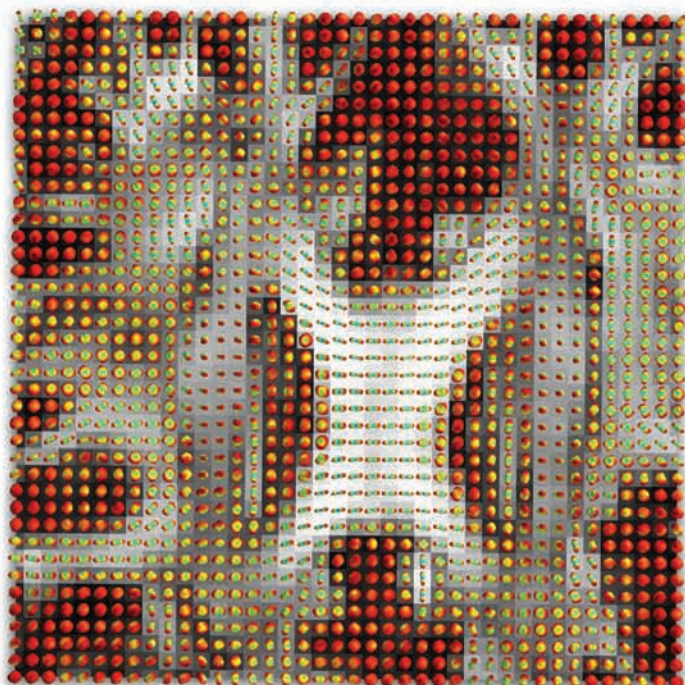
Departement Wiskundige Wetenskappe

(Wiskunde, Toegepaste Wiskunde,
Rekenaarwetenskap)



BEELD 2

BEELD 3



In 'n poging om die brein se strukturele samehang beter te verstaan, is navorsers in Toegepaste Wiskunde besig om tegnieke te verbeter vir die modellering van die verspreiding van watermolekules in die menslike brein. Die grafiese voorstellings illustreer die moontlike vloei by spesifieke punte in die brein (beelde 2, 3), terwyl beeld 1 wys hoe die inligting geïntegreer kan word om veselbane voor te stel.

Grafiese voorstellings: Dr Stéfan van der Walt
en Dr Eleftherios Garyfallidis

Departement **Wiskundige Wetenskappe**

(Wiskunde, Toegepaste Wiskunde, Rekenaarwetenskap)

Navorsingsbelange

Algebra en getalleteorie; teorie van analise, topologie en kategorie-teorie; benaderingsteorie, berekenings-wiskunde, numeriese analise en wetenskaplike berekening; diskrete wiskunde; finansiële wiskunde; biowiskunde en berekeningsbiologie; masjienleer en rekenaarvisie; IP-netwerke; outomaat-teorie en formele tale; program-verifikasie; vloeimodellering in poreuse media; programmatuur-ingenieurswese

Navorsingsuitsette

Artikels in geakkrediteerde vaktydskrifte	52
Redaksionele bedrywighede (boeke en vaktydskrifte)	vele
Boeke, konferensieverrigtinge, hoofstukke in boeke	27
MSc-studente in 2012 gegradueer	19
PhD-studente in 2012 gegradueer	9

Navorsingshoogtepunte

Navorsers in Wiskunde, Toegepaste Wiskunde en Rekenaarwetenskap het die hoë peil wat hulle in hul onderskeie spesialisgebiede behaal het, gehandhaaf. Dit word weerspieël in die groter getal publikasies in hoogaangeskrewe vaktydskrifte en die versterking van samewerking met ander navorsers en die bedryf.

Die Nasionale Navorsingstigting (NNS) het ingevolge die Suid-Afrikaanse navorsingsleerstoel-inisiatief (SARChI) ses navorsingsleerstoele aan die Universiteit Stellenbosch toegeken. Een hiervan, 'n navorsingsleerstoel in Wiskundige en Teoretiese Fisiese Biowetenskappe, is 'n gesamentlike voorlegging van die Departement Wiskundige Wetenskappe en die Afrika-instituut vir Wiskundige Wetenskappe (AIMS). Dit bied 'n opwindende geleentheid om 'n spesiale multidissiplinêre navorsingsgroep te bou.

Die nuutgestigte IBM Sentrum van Uitnemendheid vir Programmatuur maak deel uit van die IBM Akademiese Inisiatief, 'n wêreldwye program vir die fasilitering van samewerking tussen IBM en opvoeders. Hierdie sentrum sal die Afdeling Rekenaarwetenskap ondersteun in hul opleiding van hoogs vaardige rekenaarwetenskaplikes ten einde in die bedryfsbehoefte aan sodanige beroepslui in die nywerheid en sakesektor te voorsien. Hierdie sentrum sluit in 'n nagraadse rekenaarlaboratorium en 'n omgewing wat

gehalte-onderrig met blootstelling aan voorpunt- en ontluikende tegnologieë aanvul.

Die Hongaars-Suid-Afrikaanse inter-regeringsprogram vir samewerking in Wetenskap en Tegnologie, gekoördineer deur prof Leon van Wyk, het samewerking tussen Suid-Afrikaanse en Hongaarse wiskundiges wat op die gebied van niekommutatiewe ringteorie werksaam is, gestimuleer. As deel van hierdie program werk prof Van Wyk saam met prof Jenő Szigeti van die Universiteit van Miskolc, prof Hab Edmund Puczłowski van die Universiteit van Warskou, en dr Pham Ngoc Anh en dr László Márki van die Renyi-instituut vir Wiskunde in die Hongaarse Akademie vir Wetenskap. Hierdie navorsers het almal in 2012 by die Universiteit Stellenbosch besoek afgelê en prof Van Wyk het op sy beurt almal van hulle gedurende sy studieverlof in die tweede semester besoek. Hierdie navorsings-samewerking die afgelope drie jaar het die publikasie van ses navorsingsartikels en die aanvaarding van nog drie artikels tot gevolg gehad. Een van hierdie artikels is in die *Journal of Algebra*, 'n vooraanstaande internasionale vaktydskrif oor Algemene Algebra, gepubliseer en die res is in *Linear Algebra and its Applications* en *Linear and Multilinear Algebra*, albei leiërs op hul gebied van Liniêre Algebra, gepubliseer.

Dit is prysenswaardig dat 52 navorsingsartikels, waarvan 44 deur navorsers in Wiskunde geskryf is, in geakkrediteerde

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Wiskunde <http://math.sun.ac.za>

vaktydskrifte gepubliseer is. Prof Florian Breuer se referaat “Special subvarieties of Drinfeld modular varieties” is in die *Journal für die Reine und Angewandte Mathematik* gepubliseer. Hierdie vaktydskrif word as een van die top 10% van Wiskunde-vaktydskrifte beskou, op grond van artikels se trefkragtelling deur middel van die *Science Citation Index*. Prof Helmut Prodinger, die enigste A-gegradeerde navorser in die departement, het sy hoë jaarlikse publikasiesyfer van meer as tien publikasies gehandhaaf, en vyf daarvan is deur hom alleen geskryf. Prof Stephan Wagner het vyf artikels gepubliseer, waarvan drie deur hom alleen geskryf is, en dr Zurab Janelidze het vyf artikels gepubliseer, waarvan een deur hom alleen geskryf is. Daar is ook 'n toenemende tendens dat promotors hul nagraadse studente aanmoedig om hul resultate te publiseer. Vyf enkelouteur-artikels is deur doktorsale studente in Wiskunde gepubliseer.

Ons is goed by twee nasionale dissiplinekonferensies verteenwoordig. Die Afdeling Rekenaarwetenskap het sewe referate by die 2012 jaarlikse kongres van die Suid-Afrikaanse Instituut vir Rekenaarwetenskaplikes en Inligtingstegnoloë (SAICSIT 2012) gelewer. Dit was 'n groot prestasie en 'n geleentheid om hierdie afdeling van ons departement ten toon te stel. By die 55ste jaarlikse kongres van die Suid-Afrikaanse Wiskundevereniging het die Afdeling Wiskunde 24 referate gelewer – tien deur akademiese personeellede en 14 deur nagraadse studente!

Ons personeellede was ook aktief as hoofsprekers by nasionale sowel as internasionale werksessies en konferensies betrokke.

“Relaxation systems and high-order accurate flow computations” was die titel van prof Mapundi Banda se gaslesing by die Duitse Akademiese Uitruildiens (DAAD) se internasionale werksessie oor modellering, berekening en optimalisering in Indië. Prof Banda het ook 'n hooflesing getiteld “Networking flow and transport processes” by die 55ste jaarlikse kongres van die Suid-Afrikaanse Wiskundevereniging in Stellenbosch aangebied.

Prof André Weideman het 'n hooflesing getiteld “Efficient contour integrals for the numerical inversion of the Laplace transform” aangebied by die 36ste Suid-Afrikaanse Simposium oor Numeriese en Toegepaste Wiskunde (SANUM 2012), wat by die Universiteit van die Witwatersrand aangebied is. Hy het dit ook by 'n colloquium by die Universiteit van Fribourg, Switserland, gelewer.

By 'n spesialis konferensie oor getalleteorie in Duitsland was prof Florian Breuer 'n genooide spreker oor “On Drinfeld modular polynomials”.

Dr Bruce Bartlett het 'n genooide lesing getiteld “Invariants of 3-manifolds via generators and relations of the 1-2-3 bordism 2-category” by die VK/AMS-werksessie oor geometriese analise aangebied. Tydens 'n genooide navorsingsbesoek aan dr David Gay by die Universiteit van Georgia, het dr Bartlett die praatjie “Generators and relations for 1-2-3 topological quantum field theories” by die Georgia Topologie-seminaar gelewer.

Prof Willem Visser het twee gaslesings in die VSA aangebied: “Green: Reduce, reuse and recycle constraints” is by NASA se Ames-navorsingsentrum aangebied en die lesing wat hy by die Fujitsu Laboratories of America aangebied het, was getiteld “Probabilistic symbolic execution”. Prof Visser het dieselfde lesing as 'n genooide praatjie by die Koreaanse Gevorderde Instituut vir Wetenskap en Tegnologie (KAIST) in Suid-Korea gegee.

Prof Willem Visser is verkies tot die uitvoerende komitee van ACM SIGSOFT, die voorste akademiese organisasie vir programmatuuringenieurswese. Sy verkiesing dien as bewys van sy aansien as vooraanstaande, internasionaal erkende navorser in programmatuuringenieurswese. Hy het die afgelope vier jaar sy samewerking met NASA se Ames-navorsingsgroep ten opsigte van twee projekte volgehou: Java PathFinder en Symbolic PathFinder. Hy het ook referate gelewer by die Internasionale Simposium oor Programmatuurtoetsing en -analise (ISSTA) en die 20ste Internasionale Simposium oor die Grondbeginsels van Program-

matuuringenieurswese (FSE 20) (VSA). Prof Visser se referaat gegrond op sy navorsingsbesoek aan NASA in 2012 is vir die 35ste Internasionale Konferensie oor Programmatuuringenieurswese (ICSE 2013) aanvaar.

Verskeie navorsers is studieverlof toegestaan. Prof Mapundi Banda is ses maande lange navorsingsverlof toegestaan as deel van die voorwaardes van sy NSS-beroepstoekenning vir Ygegradeerde navorsers (2011-2012). Gedurende hierdie tyd het hy 'n maand as 'n besoekende professor by die Universiteit van Brits-Columbië deurgebring, waar hy met prof Douw Steyn saamgewerk het.

Dr McElory Hoffmann het die Departement Rekenaarwetenskap van die Katolieke Universiteit van Leuven (België) vir tien maande besoek. Daar het hy as 'n nadoktorsale genoot navorsing gedoen en as studieleier vir magisterstudente in die masjienleergroep opgetree.

Tydens haar studieverlof in die tweede semester het dr Karin Howell op navorsingsvlak met 'n akademikus van Rusland, dr Dennis Chistyakov, saamgewerk as deel van haar navorsingsprojek “Maximal algebras in function algebra”.

Tydens sy navorsingsverlof in die eerste semester het prof Helmut Prodinger sy wetenskaplike vennote dr Rosena Du, dr Michael Fuchs en dr Hsien-Kuei Hwang in Shanghai en Taipei ontmoet. Later die jaar het dr Fuchs prof Prodinger in Stellenbosch ontmoet. Op uitnodiging van dr Hwang het die eerprof Prodinger te beurt geval om 'n inleidende hoofstuk vir die versamelde werk van prof Philippe Flajolet te skryf. 'n Deel van sy navorsingsverlof is aan hierdie spesiale taak gewy, en die bundel behoort in 2013 gepubliseer te word.

Dr Stéfan van der Walt het 'n nadoktorsale navorsingsaanstelling in die Henry H Wheeler Jr Brain Imaging Center in die Helen Wills Neuroscience Institute van die Universiteit van Kalifornië by Berkeley aanvaar. Sy navorsing het gefokus op die analise van die veselstruktuur van die menslike brein, gegrond op diffusie-geweegde data in magnetiese

Foto: Engela Duvenage



BSc-student Heila van der Merwe toets die nuwe toerusting uit saam met prof Willem Visser, hoof van die Afdeling Rekenaarwetenskap in die Departement Wiskundige Wetenskappe (wat Wiskunde, Toegepaste Wiskunde en Rekenaarwetenskap insluit) en mnr Clayton Booysen van die IBM Sagtewaregroep.

IBM open eerste SA Sagtewaresentrum van Uitnemendheid by US

Die **Universiteit Stellenbosch (US)** en **IBM** het kragte saamgesnoer om die tekort aan rekenaarvaardighede in Suid-Afrika aan te spreek met die opening van die land se eerste Sagtewaresentrum van Uitnemendheid op 12 Junie 2012.

Dié gesamentlike akademiese inisiatief sal toerusting en opleidingshulpbronne aan nagraadse studente in Rekenaarwetenskap voorsien, waardeur hulle noodsaaklike tegniese vaardighede sal kan ontwikkel.

Dié soort sentrum is 'n nuuttjie in Suid-Afrika, en sluit 'n nagraadse rekenaarlaboratorium in die US se Afdeling Rekenaarwetenskap in. Met gevorderde sagteware soos die Rational®-ontwikkelingsomgewing, bied die fasiliteit 'n volwaardige sagtewareproduksieomgewing vir studente.

Die IBM Academic Initiative is 'n wêreldwye program waardeur IBM met opvoeders saamwerk ten einde studente met die nodige inligtingstegnologievaardighede toe te rus om mededingend te wees en met veranderinge in die werkplek tred te hou.

"Dit is belangrik dat ons die klaskamer 'n bietjie skop gee, en daarvoor moet ons die jongste tegnologie by ons kurrikulum integreer om studente op waardebelaaide werksgeleenthede voor te berei," sê prof Ingrid Rewitzky, Visedekaan: Onderrig in die US se Fakulteit Natuurwetenskappe, sowel as voorsitter van die US se Departement Wiskundige Wetenskappe (wat Wiskunde, Toegepaste Wiskunde en Rekenaarwetenskap insluit).

Die opening van die Sentrum is deel van 'n langtermynverhouding tussen die US en IBM.

resonansiebeelding. Ter ondersteuning van die projek, en as deel van 'n toenemende wêreldwye skuif na oop en reproduceerbare navorsing, is bydraes tot verskeie oopbron-programmatuurpakkette gemaak, met inbegrip van DiPy (*diffusion imaging in Python*) en die IPython-webnotaboek, 'n nuwe platform vir die intydse publikasie en deel van wetenskaplike berekeninge en skryfwerk.

Prof Leon van Wyk het sy studieverlof gewy aan sy samewerkingsprojekte met navorsers in Hongarye, as deel van die Hongaars-Suid-Afrikaanse inter-regeringsprogram vir samewerking in Wetenskap en Tegnologie. Hy het ook vir navorsingsamewerking by prof Kirby Smith van die Texas A&M Universiteit besoek afgelê.

Tydens sy ses maande lange studieverlof het prof André Weideman besoek afgelê by prof Bengt Fornberg by die Universiteit van Colorado Boulder (VSA) vir samewerking aan 'n navorsingsartikel getiteld "A computation exploration of the Second Painleve Equation" en by prof Nick Treffethan by die Wiskunde-instituut by die Universiteit van Oxford vir verdere werk aan hul opname-artikel oor die gebruik van die trapesiumreël in numeriese wiskunde. Daarby het hy ook aan konferensies in Italië, die Verenigde Koninkryk en Switserland deelgeneem.

Twee navorsers van die Buro vir Bedryfswiskunde by die Universiteit van Stellenbosch (BIWUS), dr Milton Maritz, die direkteur, en prof Francois Smit, is tans betrokke by navorsings- en ontwikkelingsprojekte op die gebied van Toegepaste Wiskunde in die privaat sektor. Dr Maritz werk saam met Rheinmetall Denel Munition aan die volgende projekte: aanpassing van STREAK; programmatuur vir die analise van strookbeelde in detonasiegebeure; aanpassing van JETP; programmatuur vir die analise (op X-straal) van partikulering in hollading-strale; FRAPP: (nuwe) programmatuur vir die simulering van trajekte van fragmente en die daaropvolgende penetrasie van plate; en driedimensionele rekonstruksie van trajekte van fragmente van twee of slegs een flits-X-straal, met of sonder

'n horisontale plaat ('n geometriese en passingsprobleem).

Prof Francois Smit is in 'n raadgevende hoedanigheid by verskeie projekte vir Rheinmetall Denel Munition (RDM), Denel Dynamics, Reutech Radar Systems (RRS), die Wetenskaplike en Nywerheidsnavorsingsraad (WNNR) en Formo Fibreglass betrokke. Sy huidige fokus is die interinstusionele projek "FLUXION: Research in the Computational Mechanics of Fluids" vir die Suid-Afrikaanse Departement van Verdediging. FLUXION is daarop gemik om vaardighede op die gebied van berekeningsmeganika en toepassings, met inbegrip van berekeningsvloei-stof-dinamika, eindige-element-analise en vloei-stof-struktuur-interaksie, te ontwikkel. Hierdie gedeelte van die LEDGER-program word deur die Lugvaart-kundestelsels-vaardighedsgebied by die WNNR bestuur. Die LEDGER-program word deur die Suid-Afrikaanse Departement van Verdediging befonds. Drie nagraadse projekte, 'n PhD in Ingenieurswese en twee MSc-projekte in Toegepaste Wiskunde is by hierdie befonding ingesluit. Prof Francois Smit tree as studieleier vir albei MSc-studente op.

As deel van die Memorandum van Verstandhouding tussen die Universiteit Stellenbosch en die WNNR is vier navorsers in Toegepaste Wiskunde betrokke by samewerkingsprojekte met navorsingseenhede by die WNNR en as studieleiers vir magister- en doktorsale studente wat by die Universiteit Stellenbosch ingeskryf is en by die WNNR gebaseer is.

Prof Francois Smit en dr Hardus Diedericks is onderskeidelik promotor en medepromotor vir doktorsale student mnr Luther Terblanche, wat werk aan "Analysis of extreme events in the coastal zone" saam met die groep vir kusingenieurswese en hawe-infras-truktuur in die Eenheid vir Geboude Omgewing by die WNNR. Hulle tree ook onderskeidelik op as studieleier en medestudieleier vir mnr Patrick Shabangu, 'n magisterstudent besig met "Investigating boundary conditions for near-shore area hydrodynamic models" saam met die groep vir kusstelsels in

die Eenheid vir Natuurlike Hulpbronne en die Omgewing by die WNNR. Hulle werk ook aan die verbetering van randwaardes van berekenings-vloeistofdinamikamodelle in toepassings teen die kus.

Dr Willie Brink werk saam met die groep vir mobiele intelligente outonome stelsels (MIAS-groep) in die Eenheid vir Modelling en Digitale Wetenskap by die WNNR.

Prof Mapundi Banda tree op as promotor vir doktorsale student me Belinda Matebese, wat saam met die MIAS-groep in die Eenheid vir Modelling en Digitale Wetenskap by die WNNR werk aan "Sampling-based algorithms for motion planning". Prof Banda tree ook op as promotor vir doktorsale student mnr Tumelo Uoane, wat werk aan "Modelling generation and transport of Acid Mine Drainage (AMD) using computational fluid dynamics (CFD) techniques" saam met die groep vir gevorderde wiskundige modellering en simulاسie in die Eenheid vir Modelling en Digitale Wetenskap by die WNNR.

Akademiese sake

Ons het nuwe inligtings- en kommunikasie-tegnologieë geïmplementeer om die meer tradisionele benaderings tot voorgraadse onderrig en leer in die departement te verbeter.

In reaksie op die behoefte van eerstejaar-Rekenaarwetenskapstudente om lesings in hul voorkeurtaal te ontvang, het dr McElory Hoffmann van video-opnames gebruik gemaak. Hy het vir 'n week die lesings in Afrikaans aangebied met Engelse video's op die web en die volgende week dit omgeruil. Studenteterugvoering was uiters positief.

Dr Milton Maritz het demonstrasies wat hy self in MATLAB ontwikkel het, gebruik in die Vektorrekening-module wat hy vir tweedejaarstudente in Ingenieurswese aangebied het, aangesien die visualisering van konsepte in vektorrekening die grondslag tot hul begrip lê. Die waardering van die studente het dit die moeite werd gemaak.

Dr Bruce Bartlett het kreatief met die uitdaging van groot tutoriaalklasse (klasse groter as die gewenste een tutor vir elke 20 studente) omgegaan. Hy gebruik die Meerveranderlike Kalkulus-kursus van MIT

Open Courseware al sedert 2011 in sy W244-klas. Die nuttigste aspek van hierdie kursus is die voordragvideo's, waarin 'n studente-instrukteur die oplossings vir sekere probleme vir 'n klein groepie studente op die swartbord demonstreer. Studente hou daarvan om te sien hoe 'n oplossing teen hul eie pas vir hulle gedemonstreer word (iets wat nie in groot tutoriaalklasse moontlik is nie). Studente put inspirasie en energie uit die idee dat hulle potensieel op dieselfde vlak as MIT-studente is.

Praktiese rekenaarlaboratoriums vir die derdejaarmodule in Numeriese Analise is deur prof André Weideman ontwikkel sodat studente die metodes wat in die lesings ontwikkel is doelmatig kan implementeer, die resultate sinvol kan interpreteer, die algoritme en/of implementering soos nodig kan verbeter, en ingeligte besluite oor die geskikste algoritme vir 'n spesifieke probleem kan neem.

In die lig van die afnemende beskikbaarheid van swartborde en die versoek van studente vir intydse notas, blyk tablette gewild te wees vir die aanbieding van lesings. Studente baat daarby aangesien lesings direk na afloop van die werklike klas op die web beskikbaar gestel kan word en die lesings deur die gebruik van kleur, prente, demonstrasies en/of uittreksels uit die handboek of ander hulpbronne aangevul word.

Wiskunde-studente van nege Suid-Afrikaanse universiteite het die eerste Somerskool in Getalleteorie, wat deur prof Florian Breuer georganiseer is, bygewoon. Hierdie geleentheid was daarop gemik om talentvolle voorgraadse studente te lok ten einde hulle bloot te stel aan 'n opwindende veld van Wiskunde wat nie deur alle universiteite in Suid-Afrika aangebied word nie en ook om hulle aan te spoor om nagraadse studie in Wiskunde te doen. Klem is op elementêre getalleteorie asook analitiese en kombinatoriese getalleteorie geplaas. Gevorderde onderwerpe soos kriptografie, diofantiese vergelykings, kardinaalrekenkunde, elliptiese kurwes, die Riemann-zetafunksie en Riemann-hipotese, Ducci-sekwensies, en die analogie tussen getalvelde en funksievelde is ook behandel.

Die honneursprogram in Finansiële Wiskunde is van stapel gestuur as 'n gesamentlike inisiatief van die Universiteit Stellenbosch, die Universiteit van Kaapstad en die Afrika-instituut vir Wiskundige Wetenskappe (AIMS). Dr Peter Ouwehand is die plaaslike koördineerder van die program. Hy bied drie van die modules aan en is ook by projeksupervisie betrokke.

Wiskunde vir Moeder Aarde

Die bekende Amerikaanse wiskundige fisikus en blogger, **Prof John Baez**, het 'n openbare lesing tydens die 55ste jaarkongres van die Suid-Afrikaanse Wiskundige Vereniging via Skype gegee, en daardeur een ton in koolstofvrystelling gespaar deur nie te vlieg nie.

Dit was die eerste keer dat die kongres, wat deur die Universiteit Stellenbosch se Departement Wiskundige Wetenskappe (Wiskunde, Toegepaste Wiskunde, Rekenaarwetenskap) gereël is, voorafgegaan is deur 'n openbare lesing. Die doel van die lesing was om mense bewus te maak van die feit dat 2013 die jaar vir Wiskunde van die Planeet Aarde (MPE) is. Dit is 'n poging van wiskunde verenigings en instellings wêreldwyd om wetenskaplikes aan te moedig om die wiskunde wat die Aarde se geologiese en biologiese prosesse onderlê, te bestudeer.

Prof Baez is ook nou betrokke by die blog *Azimuth*, wat beskryf word as 'n internasionale samewerkingsprojek om wetenskaplikes en ingenieurs so ver te kry om saam te werk om gemeenskaplike probleme soos klimaatsverandering, massa- uitsterwing en die energiekrisis aan te spreek.

Volgens Prof Baez is aardverwarming deel van 'n groter transformasieproses waartydens die mens moet beseef dat die Aarde 'n geslote sisteem is: "Ons bevolking en energieverbruik kan nie eksponensieel aanhou groei nie. Indien ons samelewing hierdie transformasie oorleef, sal die wiskundige wetenskappe daardeur geraak word – en andersom – met nêr sulke dramatiese gevolge as wat deur die landbou- of industriële revolusie veroorsaak is," skryf hy op sy blog oor die lesing.

Die res van die kongres het gefokus op die rol wat hierdie tipe jaarlikse geleenthede speel om samewerking t.o.v. wiskundige navorsing tussen universiteite in Suid-Afrika en Afrika aan te moedig.

US bied suksesvolle somerskool in getalleteorie aan

Wiskundestudente van nege Suid-Afrikaanse universiteite het van 23 tot 27 Januarie 2012 die eerste somerskool in Getalleteorie by US bygewoon.

Die skool is aangebied deur die Afdeling Wiskunde in die Departement Wiskundige Wetenskappe (Wiskunde, Toegepaste Wiskunde, Rekenaarwetenskap) onder leiding van **prof Florian Breuer** en **Lesley Wessels**.

Volgens prof Breuer was die geleentheid toegespits op besonder begaafde voorgraadse studente ten einde hulle aan hierdie opwindende wiskundige gebied bloot te stel en hulle aan te spoor om ook nagraads Wiskunde te studeer.

Die klem het op elementêre getalleteorie sowel as analitiese en kombinasiegetalleteorie geval. Gevorderde onderwerpe soos kriptografie, diofantiese vergelykings, kardinaalrekenkunde, elliptiese kurwes, die Riemann-zetafunksie en Riemann-hipotese, Ducci-sekwensies en die analogie tussen getallevelde en funksievelde het ook aandag ontvang.

Die lesings is behartig deur PhD-student **Dirk Basson** en US-wiskundiges **prof Stephan Wagner**, **dr Arnold Keet**, **prof Florian Breuer**, **dr Zurab Janelidze** en **Lesley Wessels**, sowel as **drs Christine Swart** en **Kenneth Hughes** van die Universiteit van Kaapstad.

Altesaam 28 studente (15 Suid-Afrikaanse studente en 13 studente van Afrika) in die departement het doktors- en meesters-grade ontvang. Dit het ingesluit twee PhD's in Toegepaste Wiskunde, een PhD in Rekenaarwetenskap, ses PhD's in Wiskunde, twee MSc-grade (cum laude) in Toegepaste Wiskunde, twee MSc-grade (cum laude) in Rekenaarwetenskap, tien MSc-grade (cum laude) in Wiskunde, een MSc-graad in Rekenaarwetenskap en vier MSc-grade in Wiskunde. Onder dié wat 'n PhD in Toegepaste Wiskunde ontvang het, is me Sonia Woudberg, 'n dosent in Toegepaste Wiskunde.

Sowat 20 honneursstudente gradueer elke jaar. Die meeste van hierdie studente kies om aantreklike werksaanbiedinge in Suid-Afrika by finansiële instansies, IT-maatskappye en navorsings- en ontwikkelingsinstansies soos die WNNR te aanvaar. 'n Uitdaging vir al drie afdelings is om meer Suid-Afrikaanse studente vir magister- en doktorsale studie te werf, selfs vir deelydse studie terwyl hulle in die bedryf werk.

Diens aan die wetenskaplike gemeenskap

Die 55ste jaarlikse kongres van die Suid-Afrikaanse Wiskundevereniging met die tema "Wiskunde verenig Afrika" is van 31 Oktober tot 2 November 2012 deur die departement aangebied. Die tema is gekies om die belangrike rol te beklemtoon wat hierdie jaarlikse kongresse in die bevordering van samewerkende Wiskunde-navorsingsprojekte tussen universiteite in Suid-Afrika en Afrika speel. Die reëlingskomitee – dr Bruce Bartlett, prof Florian Breuer, dr Cornelia Naude, dr Paul Grobler, dr Karin-Therese Howell, prof Stephan Wagner met prof Ingrid Rewitzky as voorsitter – het verskeie nuwe idees by die normale kongresprogram geïnkorporeer. Dit het ingesluit 'n openbare lesing op die vooraand van die kongres, asook 'n nuwe en billiker stelsel vir die evaluering van nagraadse voordragte om in aanmerking te kan kom vir die toekenning vir die beste praatjie. 'n Beter georganiseerde kongresprogram, kongresmateriaal wat die universiteit se "Go Green"-veldtog ondersteun, verpersoonlike wyngeskenke en 'n konferensiefoto was van die ander positiewe nuwighede.

Dit is 'n eer vir akademici om betrokke te wees by organisasies, verenigings of navorsingsgroepe wat op hul dissiplines toegespits is en verskeie akademiese personeellede is betrokke by die redaksionele werksaamhede van navorsingstydskrifte en/of programkomitees van navorsings-

konferensies in Rekenaarwetenskap.

Dr Sonia Woudberg sal van 2012 tot 2014 as die tesourier van die Reologievereniging van Suider-Afrika (SASOR) dien.

Dr Bruce Bartlett is 'n navorsingsgenoot van die Nasionale Instituut vir Teoretiese Fisika (NITHEP) en het gedien in die raadgevende komitee vir die "Berlin 10 Open Access"-konferensie wat in November 2012 by STIAS aangebied is.

Dr Farai Nyabadza dien as direkteur van die Canon Collins Trust in Suider-Afrika, as die sekretaris-generaal van die Afrika-vereniging vir Biowiskunde (ASB), en as die sekretaris-generaal van die Suider-Afrikaanse Vereniging van Wiskundige Wetenskappe (SAMSA).

Dr Zurab Janelidze is aangestel as konsultant vir 'n Portugese toekenningsprojek "Métodos Categoriais em Álgebra Não Abeliana", wat befonds word deur Fundação para a Ciência e a Tecnologia (FCT, Portugal).

Ter erkenning van hul beduidende bydraes tot die Afrika-instituut vir Wiskundige Wetenskappe (AIMS) is prof Stephan Wagner aangestel as 'n AIMS-medefakulteitslid, prof Florian Breuer as 'n AIMS-medena-vorsingsgenoot, en prof Ingrid Rewitzky as lid van AIMS se uitvoerende span.

Toekennings aan personeel en studente

Dr Hendrik Boshoff, mnr Piet Crous, prof Florian Breuer, prof David Holgate, dr Zurab Janelidze en dr Farai Nyabadza is vereer by 'n spesiale Eerstejaarsakademie-aand ter erkenning van hul bydrae tot die sukses van die Universiteit se topeerstejaarstudente.

Ons is trots op sowel dosente as nagraadse studente wat bekroonde referate by konferensies gelewer het.

Mnr Jacques Swanepoel, 'n junior dosent in Rekenaarvaardighede en 'n doktorsale student in Toegepaste Wiskunde, het die Internasionale Grafonomie-vereniging se toekenning vir die beste referaat deur 'n student by die *International Conference on Frontiers in Handwriting Recognition*, ontvang. Die titel van sy wenpraatjie was "Writer-specific dissimilarity normalisation for improved writer-independent off-line signature verification".

Mnr Willem Bester, dr Cornelia Inggs en prof Willem Visser het die toekenning vir die beste Rekenaarwetenskap-referaat, getiteld "Test-case generation and bug-finding through symbolic executions", ontvang by die 2012 jaarlikse kongres van die Suid-Afrikaanse Instituut vir Rekenaarwetenskap-

likes en Inligtingstegnoloë (SAICSIT 2012). Hierdie referaat is op mnr Willem Bester se navorsingswerk vir sy magistertesis gegrond.

By die jaarlikse kongres van die Suid-Afrikaanse Wiskundevereniging het mnr Dirk Basson die toekenning vir die beste doktorsale navorsingspraatjie ontvang, en mnr Tovo Randrianarisoa en mnr Anton de Villiers eervolle vermelding vir hul meestersgraad-navorsingspraatjies.

Me Maryke van der Walt het die Fakulteit Natuurwetenskappe se medalje vir 2012 vir die beste magisterstudent in die Fakulteit ontvang. Haar magistertesis getiteld "Ternary interpolation subdivision" is onder studieleierskap van prof Johan de Villiers voorberei. Sy is tans besig met haar doktorsale studie aan die Universiteit van Missouri St Louis onder promotorskap van prof Qingtang Jiang.

Mnr Jan Buys, wat sy honneursprojek in 2011 onder studieleierskap van prof Brink van der Merwe voltooi het, het in 2012 die IBM-toekenning vir die beste honneursstudent in Rekenaarwetenskap ontvang.

DAAD (die Duitse Akademiese Uitruildiens) in samewerking met die Afrika-instituut vir Wiskundige Wetenskappe (AIMS), ken jaarlikse sewe beurse van drie jaar elk aan uitsonderlike studente (wat Afrika-burgers van lande suid van die Sahara is, maar nie Suid-Afrikaanse burgers nie) toe om 'n PhD-program in Wiskundige Wetenskappe aan 'n Suid-Afrikaanse universiteit te volg. In 2012 het mnrre Eric Andriantiana, Eyaya Eneyew, Tahina Rakotoniaina en me Ony Minoarivelo sodanige beurse vir hul doktorsale studie in die departement ontvang. In Desember 2012 het 'n verdere drie studente van die Universiteit Stellenbosch – mnr Alex Bamunoba, me Savannah Nuwagaba en mnr Fortunat Solofomampionoa Rajaona – sodanige beurse ontvang.

Personeelsake

Deur die loop van die jaar is die ad hominem-bevordering van verskeie personeellede goedgekeur met ingang 1 Januarie 2013. Prof Florian Breuer, dr Farai Nyabadza en dr Karin-Therese Howell is onderskeidelik bevorder tot volle professor, medeprofessor en senior dosent (Wiskunde). Dr Stéfán van der Walt en dr Sonia Woudberg is bevorder tot senior dosent (Toegepaste Wiskunde).

In Januarie 2012 het ons prof Mapundi Banda as professor van Toegepaste Wiskunde verwelkom. Sy navorsingsbelange lê in numeriese metodes vir vloeï- en transportprosesse. Nadat Dr Gerhardus Diedericks

die akademie vir vyf jaar verlaat het om hom op navorsing as 'n numeriese modelleerder in die Eenheid vir Natuurlike Hulpbronne en die Omgewing by die WNNR toe te spits, het hy as 'n senior dosent in Toegepaste Wiskunde na die Universiteit Stellenbosch teruggekeer.

Prof David Holgate het na 15 jaar diens aan die universiteit in September bedank om die posisie van professor en voorsitter van die Departement Wiskunde en Toegepaste Wiskunde aan die Universiteit van die Wes-Kaap te aanvaar.

In November het Toegepaste Wiskunde 'n spesiale afskeidsfunksie gehou vir mnr Piet Crous, wat na 43 jaar diens aan die Universiteit Stellenbosch afgetree het. Hy was 'n toonbeeld van professionalisme en het altyd op die geheelbeeld gefokus. Sy reuse bydrae oor die jare kan nie aan getalle of toekennings gemeet word nie – hy het geslagte studente beduidend en positief beïnvloed met sy spesiale vermoë om 'n band met sy studente te vorm. Drie vakatures in die departement is deur die aanstelling van opkomende jong akademici gevul. In Rekenaarwetenskap sal Prof Bernd Fischer in Februarie 2013 in die posisie van medeprofessor begin; hy sal ook tot die navorsingsgroep vir die verifiëring van stelselprogrammatuur bydra. In Wiskunde is dr Gareth Boxall en dr Dimbinaina Ralaivaosaona onderskeidelik aangestel as dosente met ingang April 2013 en Julie 2013. Dr Boxall se navorsingskundigheid is in Modelteorie en Logika, en dié van Dr Ralaivaosaona in Probabilistiese Kombinatorika.

Gemeenskapsdiens

Die Internasionale Wiskunde-unie het "The Mathematics of Planet Earth" as die tema vir 2013 verklaar, en as gevolg van die betrokkenheid van die Suid-Afrikaanse Wiskundevereniging (SAMS) en die Afrika-instituut vir Wiskundige Wetenskappe (AIMS) in aktiwiteite wat hierdie tema vier, is daar besluit om 'n openbare lesing te reël om die 55ste jaarlikse kongres van die Suid-Afrikaanse Wiskundevereniging by die Universiteit Stellenbosch vooraf te gaan. Hierdie geleentheid, gereël deur dr Bruce Bartlett, was uniek in die sin dat prof Mark Swilling (direkteur van die Volhoubaarheidsinstituut) en prof John Baez (Universiteit van Kalifornië - Riverside) die hoofsprekers was. Hulle het hul praatjies via Skype en voorafopgeneemde video gelewer. Die geleentheid is deur sowat 190 mense bygewoon, waaronder 'n aantal leerders van die Kaapse Akademie vir Wiskunde, Weten-

skap en Tegnologie in Kaapstad, SAMS-afgevaardigdes, studente en personeellede van die Universiteit Stellenbosch, lede van die publiek en AIMS-studente. Die geleentheid is wyd aan skole in die Stellenbosch-distrik geadverteer: Prof John Baez se praatjie is op YouTube beskikbaar (<http://www.youtube.com/watch?v=L4RpU1iLg34>) en is op intydse forums bespreek.

Die *Maties Computing Club*, 'n rekenaarwetenskapklub wat tans deur mnr Willem Bester en dr Steve Kroon gekoördineer word, is deur die Afdeling Rekenaarwetenskap van stapel gestuur. By die weeklikse eenkomste word 'n interaktiewe informele lesing aangebied om leerders en mense in die bedryf, ongeag hul vlak van tegniese agtergrond, aan te spoor om programmering te doen.

As deel van haar rol as gemeenskapsinteraksie- en bemarkingsvertegenwoordiger het dr Karin-Therese Howell skoolbesoeke geïnisieer om met leerders oor Wiskundestudie en beroepsmoontlikhede te gesels. 'n Program is van stapel gestuur om oor die verloop van hul drie jaar lange graadprogram op hoogte te bly van die vordering van studente met Wiskunde as hoofvak ten einde te verseker dat die Wiskundemodules inspirerend en relevant is. Hierdie program sal volgende jaar voortgesit word.

Prof Lynette van Zijl voel sterk oor bystand vir studente met unieke uitdagings in die leeromgewing – in die besonder studente met visuele struikelblokke, met beperkte gehoor, wat op die outisme-spektrum lê, of met lees- en/of leer- uitdagings soos disleksie of disgrafie sukkel. Deur haar ontwikkeling van rekenaargesteunde terapieë het leerders en universiteitstudente met sodanige uitdagings 'n beter kans op sukses in hul studie. Dit is noemenswaardig dat hierdie tegnologiese toepassings van haar navorsingswerk in outomateteorie is, en dat skole haar vir konsultasie oor bystandstegnologie nader.

Die Departement Wiskundige Wetenskappe, onder koördinering van prof Pieter Maritz, is een van die opleidingsentra van die *Siyanoqoba*-program vir olimpiadeopleiding op streeksvlak (geborg deur die Departement van Wetenskap en Tegnologie en aangebied deur die Suid-Afrikaanse Wiskundestigting). Die doelwit van die program is om hoërskoolleerders wat vir olimpiade-kompetisies inskryf, te help ten einde hul prestasie en bekwaamheid te verbeter. Prof Stephan Wagner en dr Steve Kroon was by die opleidingsessies betrokke. Die departement het daarbenewens, onder leierskap van prof Stephan Wagner, sy



MSc-student mnr Willem Bester

Rekenaarwetenskapstudent wen toekening vir beste voordrag

Studente van die Universiteit Stellenbosch se Afdeling Rekenaarwetenskap in die Departement Wiskundige Wetenskappe het 'n rekordgetal voordragte gelewer tydens die jaarlikse navorsingskonferensie van die Suid-Afrikaanse Instituut vir Rekenaarwetenskaplikes en Inligtingstegnoloë (SAICSIT 2012) wat van 1 tot 3 Oktober 2012 in Centurion, Gauteng aangebied is.

Boonop het **mnr Willem Bester** die toekening vir die beste navorsingsvoordrag in Rekenaarwetenskap ontvang vir sy navorsing getiteld: "Bug-finding and automatic test-case generation through symbolic execution." Die voordrag is gebaseer op sy MSc-studie onder leiding van **prof Willem Visser** en **dr Cornelia Inggs**.

aktiewe betrokkenheid by die opleidingsprogram vir die Suid-Afrikaanse Wiskunde-olimpiade (geborg deur Harmony Gold Mining) voortgesit met 'n opleidingskamp elke Desember en deur deel te wees van die komitees wat vir die opstel en moderering van die jaarlikse vraestelle vir die Suid-Afrikaanse Wiskunde-olimpiade verantwoordelik is.

Samewerking SUID-AFRIKA

Afrika Instituut vir Wiskundige Wetenskappe (AIMS)
Denel
Gensec Batebestuur
iThemba Labs
Nelson Mandela Metropolitaanse Universiteit
Reutech Radar Systems
Rheinmetall Denel Munition
SASOL
Universiteit van Pretoria
Universiteit van die Witwatersrand
Wetenskaplike en Nywerheidsnavorsingsraad

AFRIKA

Nasionale Universiteit van Wetenskap en Tegnologie (Zimbabwe)
Universiteit van Antananarivo (Madagaskar)
Universiteit van Botswana (Botswana)

INTERNASIONAAL

Argentinië

Die Buenos Aires Instituut van Tegnologie (ITBA)

Australië

Universiteit van Melbourne

België

Katolieke Universiteit Leuven

Duitsland

Universiteit van Kassel
Universiteit van Tübingen

Hongarye

Hongaarse Akademie vir Wetenskappe
Universiteit van Miskolc

Ierland

Trinity College Dublin

Meksiko

Nasionale Onafhanklike Universiteit van Meksiko (UNAM)

Oostenryk

Alpen-Adria Universiteit van Klagenfurt
Graz Universiteit van Tegnologie
Weense Universiteit van Tegnologie

Pole

Nasionale Instituut vir Telekommunikasie
Universiteit van Warsaw

Portugal

Sentrum vir Wiskunde aan die Universiteit van Coimbra (CMUC)

Roemenië

Universiteit van Boekarest

Rusland

Gesamentlike Instituut vir Kernkragnavorsing (JINR)
Staatsuniversiteit van Moskou

Serwië

Universiteit van Kragujevac

Switserland

ETH Zürich

Verenigde State van Amerika

Georgia Southern University
NASA Ames Navorsingsentrum
Internasionale Universiteit van Texas A&M (TAMU)
Universiteit van Colorado Boulder
Universiteit van Nebraska-Lincoln

Befondsing

Buro vir Industriële Wiskunde aan die Universiteit Stellenbosch (BIWUS)
Krygkor
Mellon Early Researcher Career Programme (Mentorskapprogram)
Nasionale Navorsingstigting Aansporingsbefondsing
Nasionale Navorsingstigting Bilaterale samewerking:
Hongarye
Nokia Siemens Netwerke
Telkom
Universiteit Stellenbosch

Personeel

Doserend

Prof IM Rewitzky (*uitvoerende hoof*)

Prof MK Banda

Dr B Bartlett

Prof F Breuer (*afdelingshoof*)

Dr WH Brink

EJ Burger

Dr J Coetzee

PH Crous

Dr GH Diedericks

Prof A Fransman

Dr J Geldenhuys

I Govender

Prof BW Green

Dr PJP Grobler

Prof J Hargrove

HA Haroldt

Prof BM Herbst

Dr M Hoffman

Prof D Holgate

Dr K-T Howell

Dr CP Inggs

Dr Z Janelidze

Dr AP Keet

Dr RS Kroon

Dr MF Maritz

Prof S Mouton

Dr MA Muller

Dr NL Muller

Dr CG Naude

Dr F Nyabadza

Dr P Ouwehand

Prof H Prodinge

Prof GJF Smit (*afdelingshoof*)

JP Swanepoel

Prof AB van der Merwe

Dr S van der Walt

Prof L van Wyk

Prof L van Zijl

Prof W Visser (*afdelingshoof*)

Prof S Wagner

Prof JAC Weideman

LK Wessels

Prof M Wild

S Woudberg

Buitengewone professore

Prof JM de Villiers

Prof MB Dwyer

Prof T Krzesinski

Prof JW Sanders

Prof B Schölkopf

Buitengewone medeprofessor

Prof K Scheffler

Buitengewone senior lektore

Dr R Ghomrasni

Dr A Welte

Buitengewone lektor

Dr R Ouifki

Buitengewone navorsers

Prof D Laurie

Prof P Maritz

Dr C Rohwer

Ondersteuningspersoneel

M Abrahams

A Adams

L Adams

W Bester

W Isaacs

B Jacobs

OM Marais

MM Rhoda

AL Roman

D Stephanus

M van Niekerk

Navorsers met NNS-graderings

Toonaangewende internasionale navorser

Prof Helmut Prodinge

(*analise van algoritmes, getalteorie en kombinasieleer*)

Internasionaal erkende navorser

Prof Ben Herbst

(*rekenaarvisie en masjienleer*)

Prof David Holgate

(*kategorieteorie*)

Prof Leon van Wyk

(*ringteorie en matriksalgebra*)

Prof Willem Visser

(*programmatuur-defek, programmatuur-ingenieurswese en programmatuur-ontwikkeling*)

Prof André Weideman

(*numeriese analise en wetenskaplike berekening*)

Gevestigde navorser

Prof MK Banda

(*numeriese metodes vir vloeï- en vervoerprosesse*)

Dr Jaco Geldenhuys

(*programmatuur-ingenieurswese, in die besonder modelkontrolering en proses-algebra*)



By die toekenningsereemonie is Jacques Swanepoel (regs) afgeneem saam met medewenner George Eskander, Angelo Marcelli van die Internasionale Grafonomiese Vereniging (IGV), Sebastiano Impedovo, voorsitter van die internasionale konferensie, en Rejean Plamondon (IGV).

Handtekeningkenner wen toekening in Italië

Jacques Swanepoel, 'n doktorsale student in Toegepaste Wiskunde, het internasionale erkenning ontvang vir die spesifieke algoritmes wat hy ontwikkel het om statiese handskrifverifikasie – soos op 'n tjek – te vergemaklik.

Swanepoel het in Italië die Internasionale Grafonomie-vereniging se toekening vir die beste voordrag deur 'n student ontvang tydens 'n internasionale konferensie oor handskrifherkenning, die International Conference on Frontiers in Handwriting Recognition. Grafonomie hou verband met handskrifontleding, -herkenning en -produksie.

Die titel van sy wenpraatjie was "Writer-specific Dissimilarity Normalisation for Improved Writer-independent Off-line Signature Verification". Die term "off-line" by handskrifontleding verwys na "tradisionele pen-op-papier handtekeninge" wat met 'n skandeerder gedigitaliseer word. Sogenaamde "on-line" handtekeninge word met 'n digitale pen op 'n tablet gemaak.

Sy navorsing het nie om dowe neut 'n toekening ontvang nie. Hy het dit reeds getoets aan die hand van Dolfing se datastel, 'n databasis van 1 530 egte handtekeninge en 3 000 vervalste weergawes, en gevind dat sy stelsel telkens beter daartoe in staat is om die ware Jakob uit te wys as enige ander bestaande stelsel.

Dit sal onder meer van groot waarde wees in die bankwese, waar dit nodig is om eers die egtheid van 'n handtekening op 'n tjek of kredietkaartstrokie vas te stel voordat uitbetalings gemaak mag word.

Swanepoel onderneem sy doktorsale navorsing onder leiding van **dr Hanno Coetzer** van die Afdeling Toegepaste Wiskunde in die Departement Wiskundige Wetenskappe (Wiskunde, Toegepaste Wiskunde, Rekenaarwetenskap). Dit vorm deel van navorsing wat in die afdeling gedoen word oor rekenaarvisie, patroonherkenning en masjienleer.

Dr Sonja Mouton
(Banach algebras en spektraalteorie)

Dr F Nyabadza
(biowiskunde)

Prof Ingrid Rewitzky
(die wiskunde van rekenaarwetenskap)

Prof Brink van der Merwe
(outomaatteorie)

Prof Lynette van Zijl
(teoretiese rekenaarwetenskap en ondersteunende tegnologieë)

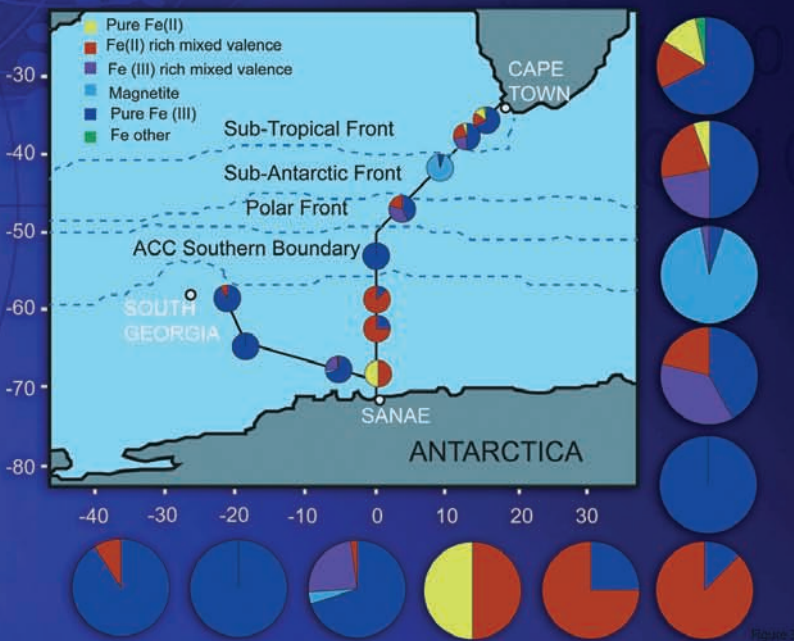
Belowende jong navorsers

Prof Florian Breuer
(getalleteorie)

Dr Zurab Janelidze
(kategorieteorie en universele algebra)

Prof Stephan Wagner
(kombinasieleer en grafiekteorie)

Department of **Earth Sciences**



Researchers study the chemical and mineralogical composition of iron particulates in the ocean between Cape Town and Antarctica. This adds to our understanding of how trace nutrients impact on the productivity of oceans, thereby affecting the global carbon cycle, ocean acidification and climate change. The map and pie charts above show the relative distribution of iron species as defined by their spectral features. The results of this study were published in the leading scientific journal, *Science*.

Department of **Earth Sciences**

Research Interests

Tectonics and orogenic processes; sedimentology of the Karoo Basin; petroleum geology; petrogenesis of granitic rocks; metamorphic petrology; trace-element and isotope geochemistry; experimental petrology; shear-zone hosted gold deposits; massive sulphide deposits; heavy mineral placer deposits; metallogenesis of mobile belts; environmental water and soil geochemistry.

Research outputs

Articles in accredited journals	19
Books	1
Conference proceedings	1
Editorial activities (books and journals)	4
MSc students graduated in 2012	8
PhD students graduated in 2012	5

Research highlights

Prof Gary Stevens's SARChI Chair was renewed and upgraded to a Tier I Chair, with increased funding. His NRF research rating was upgraded. He delivered a keynote address entitled "From Anatexis to Granite: an Examination of How Melt Chemistry and Peritectic Assemblage Entrainment Shape Granite Compositions" at the 34th International Geological Congress (Australia).

Prof Abraham Rozendaal chaired and presented a lecture in the Council for Geoscience Namaqualand Initiative Workshop, held in November.

Prof Alex Kisters' NRF rating was upgraded to B and he has secured significant funding for a major, three-year research project in Tanzania with AngloGold Ashanti.

Prof Ian Buick has secured three years of funding as a Special Visiting Researcher as part of the Brazilian Science Without Borders programme.

PhD student Bjorn von der Heyden, his supervisor Prof Alakendra Roychoudhury and a number of other contributors jointly published a high-profile paper in the journal *Science*. The title of the paper is: "Chemically and Geographically Distinct Solid-Phase Iron Pools in the Southern Ocean".

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Academic affairs

The honours cohort for 2012 is a record 34 students and is indicative of the year-on-year increases that we have been able to sustain since 2007 when we had halve that number. Given the nature of our project-driven honours programme the large numbers are proving difficult to handle. This has no impact on the department's ability to supervise MSc and PhD students, as these are recruited from external sources as well as the best of our own honours graduates.

The department also hosts 18 MSc and seven PhD students, a substantial cohort considering the size of our staff complement.

Service to the scientific community

Prof John Clemens chaired the Earth Sciences Ratings Panel of the National Research Foundation (NRF). He is the founding president of the Igneous and Metamorphic Studies Group (affiliated with the Geological Society of SA) and a member of the Post-NOMAD drilling programme steering committee.

Prof Alakendra Roychoudhury is an associate editor of the international journal *Applied Geochemistry*, a member of the Council for the International Association of GeoChemistry (IAGC), a member of the Awards Committee of the IAGC and the Geochemical Society and a founder member of Africa Earth Observatory Network (AEON). In addition he is also a board member of the Marine Research Institute (MA-RE) at the University of Cape Town, a steering committee member of the Applied Centre for Climate and Earth Systems Science (ACCESS), of the International Geotraces Programme, and of the National Oceanographic Equipment and Planning Committee.

Prof Gary Stevens is a committee member of the Western Cape Regional Expensive Equipment Programme (REEP). He also contributes in his position as Director of the Central Analytical Facility (CAF) at Stellenbosch University and, perhaps most importantly, as the SARChI Chair of Experimental Petrology, hosted within the Department of Earth Sciences, as part of the South African Research Chair Initiative (SARChI) Programme. He is a member of the editorial boards of *Lithos*, *Terra Nova* and the *Journal of Metamorphic Geology*.

Prof Alex Kisters serves on the editorial

board of the *South African Journal of Geology* and as a panel member of the NRF South African National Antarctic Programme (SANAP).

Prof Ian Buick is a member of the editorial boards of *Lithos* and *Gondwana Research*.

Dr Jodie Miller chairs the Western Cape Branch of the Geological Society of South Africa (GSSA).

Prof Dirk Frei is a permanent member of the European Science Foundation's pool of reviewers for research proposals.

The academic staff in the department regularly serve as reviewers of scientific papers, research proposals and rating applications (nationally and internationally). They also acted as external examiners of MSc and PhD candidates.

Awards to staff and students

Ms Tarryn-Kim Rudnick was presented with the Geological Society of South Africa's Houghton Award for the best BSc Honours thesis in earth sciences at a South African university. Her thesis concerns aspects of the origin of the Swartberg Cu-Pb-Zn-Ag deposit in the northwest of South Africa.

Staff matters

Dr Catherine Clarke (environmental and soil geochemistry) left the Department of Earth Sciences and transferred to Soil Science as a lecturer. Her replacement, Dr Susanne Fietz, takes up her duties on 1 January 2013.

During 2012, Prof Axel Gerdes from Goethe University (Germany) was appointed as Extraordinary Professor. Prof Gerdes is a renowned researcher in geochemistry and isotope geoscience.

Collaboration

SOUTH AFRICA

Agricultural Research Council, Nietvoorbij
Council for Geosciences
Council for Scientific and Industrial Research
iThemba Labs
Rhodes University
South African Nuclear Energy Corporation
University of Cape Town
University of Pretoria
University of the Western Cape
University of the Witwatersrand

AFRICA

Geological Survey of Namibia
University of Namibia

INTERNATIONAL General

Geotraces International (Australia, UK, USA)

Australia

Australian National University
Curtin University of Technology
James Cook University
Monash University
Museum Victoria
University of Adelaide

Brazil

Federal University of Ouro Preto

Canada

McGill University
University of Ottawa

China

China University of Geosciences, Wuhan Campus

Denmark

Geological Survey of Denmark and Greenland

Finland

University of Helsinki

France

University Blaise-Pascal, Clermont-Ferrand
University of Brest
University of Paris VII
University of Rennes
University of St Etienne

Germany

Aachen University of Technology
Freiburg University
Memorial University
University of Hamburg

India

University of Rajasthan
Indian Institute of Technology Kharagpur

Ireland

University College Dublin

Italy

University of Padova

Japan

Shizuoka University

The Netherlands

Delft University of Technology
Rijks University of Groningen
University of Utrecht

Spain

University of Grenada

Sweden

Linköping University

Switzerland

University of Lausanne

Photo: Engela Duvenage



Mr Bjorn von der Heyden and his study leader Prof Alakendra Roychoudhury.

Doctoral student publishes in Science

In a first for the Faculty of Science, one of our doctoral students made history when he published in *Science*, one of the world's leading academic journals.

The article, by **Bjorn von der Heyden** and his supervisor, **Prof Alakendra Roychoudhury** of the Department of Earth Sciences, was published in the November 2012 issue of *Science*, in collaboration with Princeton University and the Council for Scientific and Industrial Research (CSIR).

The study – of iron particulates in the ocean between Cape Town and Antarctica – is the first of its kind and the samples were collected during three research trips across the Southern Ocean. The chemical and mineralogical composition of particles in the surface seawater samples was analysed and researchers then identified five different types of iron particles. The finding adds to the understanding of how trace nutrients impact on the productivity of oceans, thereby affecting the global carbon cycle, ocean acidification and climate change.

Mr von der Heyden developed a novel technique to understand iron particle chemistry and used an X-ray-based method to locate, analyse and map nanosized particles in the seawater. For this, he had to use synchrotron apparatus at Lawrence Berkeley National Laboratory, because similar particle accelerators are not yet available anywhere in Africa.

United Kingdom

Durham University
Leeds University
Liverpool University
University of Edinburgh
Newcastle University

United States of America

Colorado School of Mines
Lehigh University
Princeton University
Woods Hole Oceanographic Institute

Funding

Anglo Base Metals
AngloGold
AngloGold Ashanti
AngloPlatinum
Australian Research Council
BHP Billiton
Chevron Texaco
ConocoPhillips
Council for Scientific and Industrial Research
European Union
ExxonMobil
Geological Society of South Africa
Government of Gabon
Inkaba ye Africa
Kumba Resources
Namaqua Sands
National Research Foundation
Schlumberger
StatoilHydro
TransHex
Water Research Commission

Staff

Academic

Prof JD Clemens
Prof IS Buick
Dr R Heyn
Prof A Kisters
Dr M Klausen
Dr D Mikes
Dr J Miller
Prof A Roychoudhury (*departmental head from October 2012*)
Prof A Rozendaal
Prof G Stevens

Extraordinary professors

Prof A Gerdes
Prof N Phillips
Prof W Verwoerd

Extraordinary associate professors

Prof D Frei

Extraordinary senior lecturer

Dr I Basson

Support staff

L Conradie
G Olivier
F Timmey

NRF-rated researchers

Internationally acclaimed researcher

Prof John Clemens
(*igneous and experimental petrology*)
Prof Ian Buick
(*metamorphic petrology, geochemistry and isotope geochemistry*)
Prof Gary Stevens
(*SARCh Chair of Experimental Petrology*)
Prof Alex Kisters
(*structural geology and tectonics*)

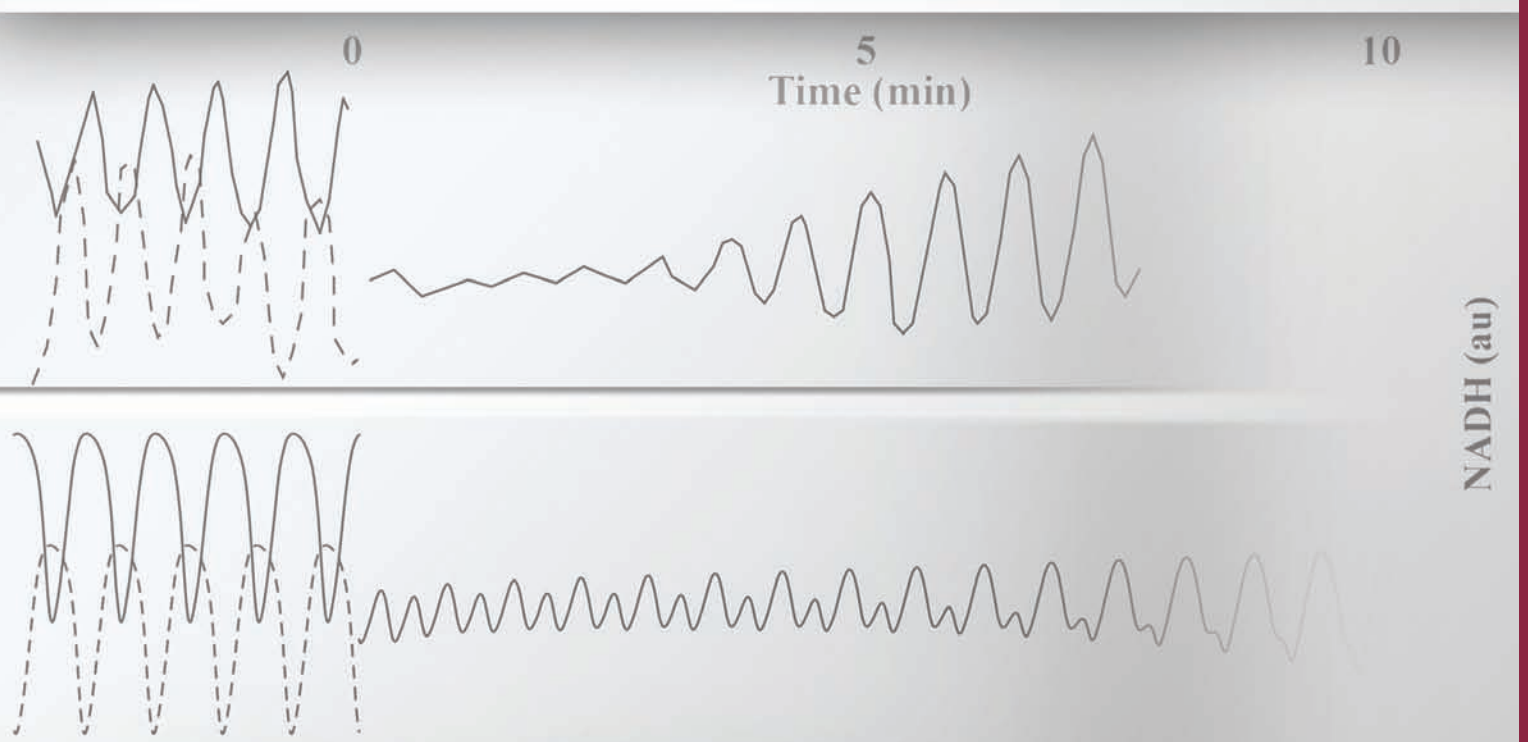
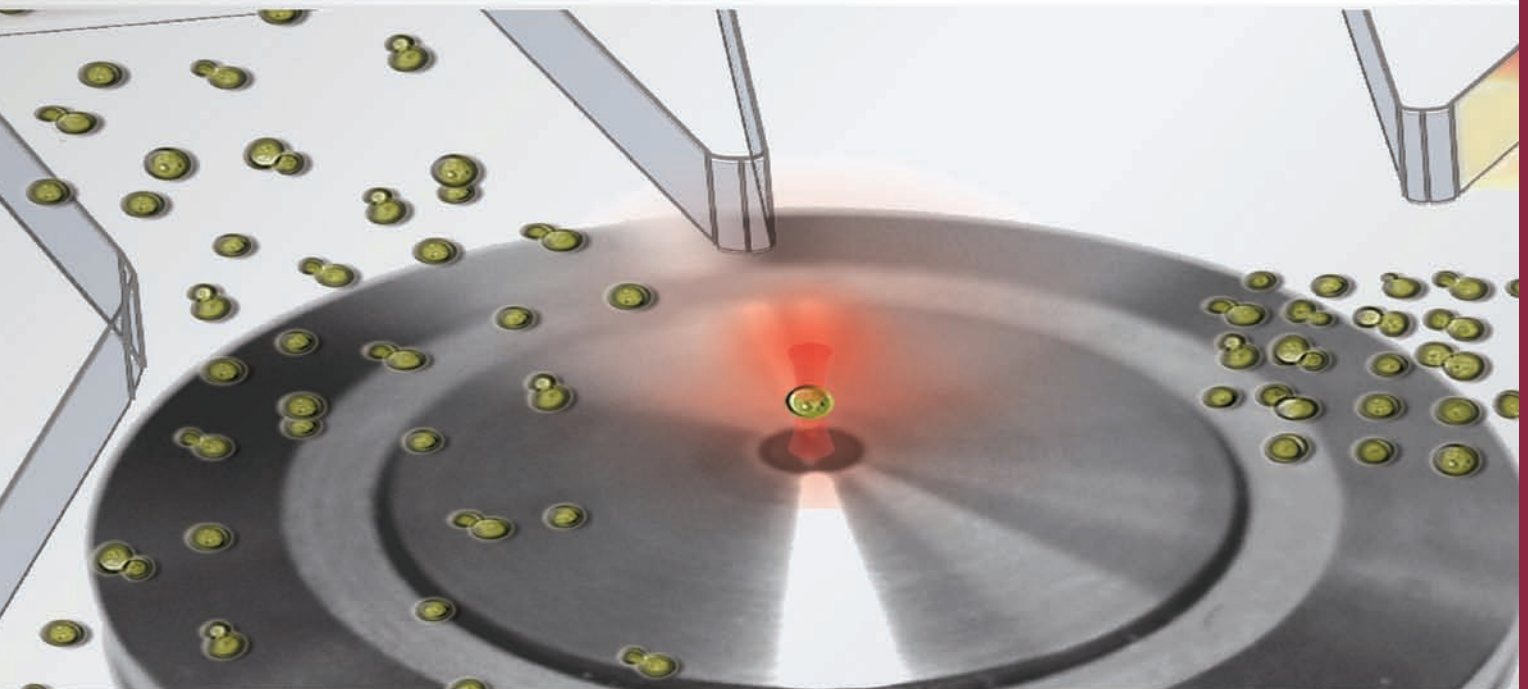
Established researcher

Prof Alakendra Roychoudhury
(*environmental geochemistry and hydrology*)

Scientists are studying the control and regulation of cellular processes using theory, computer modelling and experimental approaches. In this instance, they constructed a detailed mathematical model for yeast glycolytic oscillations to study the synchronisation of out of phase yeast populations in mixing experiments. They then used the same model to find experimental conditions for metabolic oscillations in isolated yeast cells. Together with researchers from the University of Gothenburg they were the first to observe sustained glycolytic oscillations in isolated yeast cells. Optical tweezers were used to position the cells, and a microfluidic chamber to control the environment.

Graphics: Prof Jacky Snoep

Department of **Biochemistry**



Department of **Biochemistry**

Research Interests

Antibiotics and membrane active peptides; application of bio-active peptides in agriculture; bioactivity of rooibos, honeybush and *Sutherlandia frutescens*; biocatalysis; computational and experimental systems biology; enzyme inhibitor development; malaria metabolism and antimalarial drugs; mechanistic enzymology; membrane affinity separation; natural products; ostrich pathology and vaccine development; plant molecular systematics; potato virus systematics and detection; adrenal and prostate steroid hormone biosynthesis and metabolism; steroid receptors and binding proteins.

Research outputs

Articles in accredited journals	31
Editorial activities (books and journals)	6
Books, conference proceedings, chapters in books	3
MSc students graduated in 2012	9
PhD students graduated in 2012	5

Research highlights

The Biochemistry Department was strongly represented at the 23rd Congress of the South African Society of Biochemistry and Molecular Biology which was held in January 2012 in conjunction with the Federation of African Societies of Biochemistry and Molecular Biology in the Drakensberg. Prof Erick Strauss presented the Beckman Coulter/SASBMB silver medal lecture as the winner of this award for 2010. Prof Ann Louw and five of her students presented two oral presentations and three poster presentations. Prof Marina Rautenbach and six of her students presented two oral and five poster presentations.

Dr Donita Africander attended the Cold Spring Harbor Laboratory Meeting on Nuclear Receptors and Disease in New York (USA) and presented a poster on her research. Prof Dirk Bellstedt and one of his students presented two lectures at the 5th PVYWide Organization Meeting in Edinburgh (Scotland) and subsequently visited the Royal Botanic Gardens Edinburgh.

Prof Ann Louw presented an invited lecture at the Symposium on Bioactive Principles of Medicinal Plants and Diet at the Technische Universität Dresden (Germany) in October 2012. She presented a poster at the combined congress of the Federation of European Biochemistry Societies

(FEBS) and the International Union of Biochemistry and Molecular Biology (IUBMB) in Seville (Spain) in September 2012.

Prof Marina Rautenbach was a visiting scientist at the Leipzig Institute for Molecular Pharmacology in Berlin (Germany) in July 2012. She gave three poster presentations at the 3rd International Conference on Antimicrobial Peptides in Villeneuve d'AscQ (France). Prof Johann Rohwer presented a lecture at the 5th Annual Conference on Python in Science (EuroScipy 2012) held in Brussels (Belgium).

Prof Jacky Snoep's research group, together with Swedish collaborators, published three back-to-back papers in the *Federation of European Biochemical Societies Journal* (FEBSJ) on glycolytic oscillations. These papers were also selected for the virtual issue of the journal to showcase excellent examples of systems biology work. Dr Anna-Karin Gustavsson (a Swedish participant) received the award for the best young scientist's contribution.

Prof Erick Strauss gave an invited lecture at the Zing Natural Products Conference in Lanzarote (Spain) in February 2012. Prof Pieter Swart presented a plenary lecture at the Molecular Medicine Conference 2012 (MMC2012) held in Bangkok (Thailand) in December 2012.

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Academic affairs

One of the strengths of the Biochemistry Department is its large number of postgraduate students: in 2012 the department enrolled 20 Honours students, 34 MSc students and 23 PhD students.

Service to the scientific community

Dr Donita Africander served as treasurer of the South African Society of Biochemistry and Molecular Biology.

Prof Johann Rohwer was a member of the international Standards for Reporting Enzymology Data (STRENDa) commission and served as an associate editor of *BMC Systems Biology*. He was also elected to the editorial board of *Frontiers in Plant Systems Biology*.

Prof Jacky Snoep served as editor for the following journals: *Federation of European Biochemical Society Journal (FEBS)*, *Microbiology*, *IET Systems Biology*, and *Metabolomics*.

Awards to staff and students

Two academic staff members were successful in their applications to the NRF for re-evaluation. Prof Jacky Snoep improved his rating from B3 to B2 and Prof Ann Louw improved her rating from C3 to C2.

Dr Karl Storbeck and Ms Lindie Schloms both received an Award of Excellence for young researchers at the 15th Conference of the Adrenal Cortex in Texas (USA) in June 2012.

Prof Jacky Snoep was awarded a SARCHI research chair in mechanistic modelling of health and epidemiology, to work on a mechanistic understanding and mathematical modelling of whole body disease state during malaria and HIV infections, and diabetes type II development. He will work closely with the South African Centre for Epidemiological Modelling and Analysis (SACEMA) on modelling HIV epidemiology.

Staff matters

Dr Karl Storbeck was appointed as a lecturer with effect from 1 June 2012. Mr Charlton Jansen was appointed as an assistant with effect from 1 July 2012.

Community interaction

Prof Marina Rautenbach gave two talks on proteins and amino acids in natural fertilisers to wine farmers in the Boland. The aim of these talks was to showcase the role of biochemistry in agriculture. She also acted as consultant for several companies such as SABMiller, Rhodes Food Group, Diasorin and EcoFert.

Collaboration

SOUTH AFRICA

BBI Enzymes
Council for Scientific and Industrial Research, Biosciences
Department of Biochemistry, University of Pretoria
Departments of Chemistry and Molecular and Cell Biology, University of Cape Town
Department of Medical Bioscience, University of the Western Cape
Diasorin
EcoFert
Elsenburg Agricultural College
Grootfontein Agricultural Development Institute
Institute of Pharmacology, University of Cape Town
Medical School
Klein Karoo Group
Mohair South Africa
Post-Harvest & Wine Technology Division, Agricultural Research Council, Infruitec-Nietvoorbij
Potatoes South Africa
Research Solutions
Rhodes Food Group
SABMiller
South African Rooibos Council
SurePure
School of Biochemistry, Genetics and Microbiology, University of KwaZulu-Natal
School of Chemical and Metallurgical Engineering, University of the Witwatersrand
Unit for Drug Research and Development, North West University

INTERNATIONAL

Australia

Australian National University
La Trobe University

Germany

Leibniz Institute of Molecular Pharmacology
Max Planck Institute of Chemical Ecology
Max Planck Institute of Molecular Plant Physiology

Hungary

Department of Inorganic and Analytical Chemistry, University of Debrecen

Italy

Italian National Research Council (CNR), Institute of Protein Biochemistry

Netherlands

Vrije Universiteit Amsterdam

Spain

Universitat Autònoma de Barcelona

Sweden

University of Gothenburg

Switzerland

University of Zürich

United Kingdom

Royal Botanic Garden Edinburgh
University of Aberdeen
University of Edinburgh
University of Manchester

United States of America

Department of Physiology, Medical College of Georgia,
Department of Chemistry, University of Wisconsin
Department of Dermatology and Urology, Feinberg School of Medicine, Northwestern University, Chicago
Department of Molecular and Integrative Physiology and Internal Medicine, University of Michigan

Funding

BBI Enzymes
Biopep Research Fund
Cancer Association of South Africa
Ernst Oppenheimer Fellowship Trust Fund
German/South African Bilateral Fund
Hungarian/South African Bilateral Fund
Klein Karoo Group
Medical Research Council
Mohair South Africa
National Research Foundation
Potatoes South Africa
Research Solutions
SABMiller
South African HIV/AIDS Research and Innovation Platform
South African Malaria Initiative
South African Rooibos Council
SurePure
Stellenbosch University
Technology and Human Resources for Industry Programme (THRIP)
Water Research Commission

Biochemist receives further funding for rooibos research

Prof Amanda Swart is one of a handful of South African scientists whose research endeavours are to benefit from a R2 million research grant from the South African Rooibos Council (SARC).

Prof Swart is a biochemist and an associate professor in the SU Department of Biochemistry. For the past four years she has received SARC-funding for her work on the unique ability of red bush tea to lower stress levels.

Prof Swart published scientific evidence that rooibos tea lowers the production of cortisol, the so-called "stress hormone". Cortisol is produced by the adrenal glands in the human body. Although cortisol is part of the normal human metabolism, stressful lifestyles can result in high levels of this steroid hormone. The overproduction of cortisol as a result of stress can lead to a number of lifestyle diseases such as hypertension, metabolic syndrome, cardiovascular disease, insulin resistance and Type 2 diabetes.

Her research team was able to pinpoint two rare components in rooibos – the two flavonoids called aspalathin and nothofagin – that have an influence on the biosynthesis of cortisol. Aspalathin has not been found in any other plant material, while nothofagin has a very limited distribution in nature.

Staff

Academic

Prof P Swart (*head of department*)
 Dr DJ Africander
 Prof DU Bellstedt
 Dr A Botes
 Prof J-HS Hofmeyr
 Prof A Louw
 Prof M Rautenbach
 Prof JM Rohwer
 Prof JL Snoep
 Dr K Storbeck
 Prof E Strauss
 Prof AC Swart

Extraordinary professor

Prof WCA Gelderblom

Support Staff

W Maart (*secretary*)
 AP Arends
 KD Botha
 R Brandt
 CA de Villiers
 L du Toit
 A Februarie
 LL Foster
 GD Gerstner
 CR Jansen
 C Langeveldt
 RP Louw
 Dr MA Stander

NRF-rated researchers

Leading international researcher

Prof Jannie Hofmeyr
(systems biology and complexity studies)

Internationally acclaimed researcher

Prof Johann Rohwer
(systems biology)

Prof Jacky Snoep
(systems biology)

Prof Pieter Swart
(adrenal steroidogenesis, affinity separation and protein immobilisation)

Established researcher

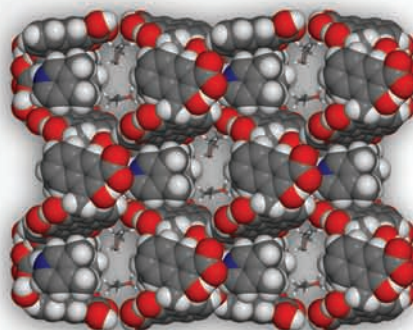
Prof Dirk Bellstedt
(molecular systematics and immunology)

Prof Ann Louw
(steroid receptors, bioactivity of honeybush)

Prof Amanda Swart
(bioactivity of honeybush and Sutherlandia frutescens)

NRF Prestigious Awardee

Prof Erick Strauss
(mechanistic enzymology and inhibitor development)



Department of **Chemistry** and **Polymer Science**

If we can understand the way molecules crystallise, we can begin to control it and thus design materials with specific desirable properties. Researchers recently conducted a systematic analysis of the solid-state structures of organic carboxylate salts, and found that organic salts can be used to form porous materials. One of the materials, shown here, is able to exchange the solvent included in channels in the crystal for several different solvents on exposure to vapour of the second solvent. This happens in a single-crystal-to-single-crystal fashion, in other words the integrity of the crystal is preserved throughout this exchange process. This research was published in *Chemical Communications*, and was one of the top ten most accessed articles in August 2012.

Images courtesy of: Dr Delia Haynes

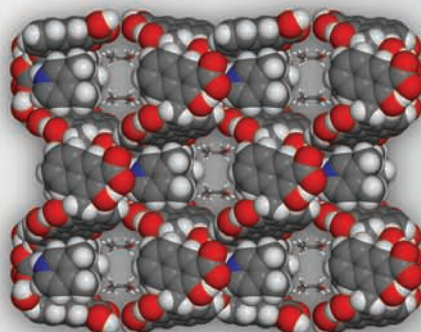
START



12 HOURS



24 HOURS



Department of **Chemistry and Polymer Science**

Research Interests

Synthetic methodology directed towards useful new compounds and materials (catalysts, polymers, other supramolecular frameworks with application potential, membranes and biologically active compounds); separation technology and advanced analysis (GC-MS, HPLC-MS, GPC, electroanalysis, NMR, polymer separation, AFM, ICP-MS, CRYSTAF and X-ray diffraction); modelling of molecular structure; platinum metals chemistry research in the context of refining and purification; medicinal chemistry.

Research outputs

Articles in accredited journals	90
Articles in non-accredited journals	8
Conference proceedings	2
Chapters in books	4
MSc students graduated in 2012	18
PhD students graduated in 2012	13
DSc students graduated in 2012	1

Research highlights

The department's research productivity continued to grow and reached a record in 2012, with 82 peer-reviewed papers, 10 published symposium and conference proceedings and four chapters in books appearing. Moreover, in December 2012 one DSc, eight PhD and three MSc degrees (one *cum laude*) were awarded, while in the March 2013 graduation ceremony, an additional 5 PhD and 10 MSc (one *cum laude*) degrees were conferred. Prof Bert Klumperman graduated DSc, the only one in more than a decade, while also having guided four students to their PhD graduation.

The high-impact journal of the Royal Society of Chemistry (RSC), *Chemical Communications*, featured an article by Dr Delia Haynes and co-workers on its cover. The title of the article is "Interconversion between different stoichiometric forms of a three-component crystal via liquid-assisted grinding".

Dr Katharine de Villiers-Chen, Dr Tanya Le Roux and PhD student Kalifi Gildenhuys published a full paper, titled "The Single Crystal X-ray Structure of β -Hematin DMSO Solvate Grown in the Presence of Chloroquine, a β -Hematin Growth-Rate Inhibitor" in the *Journal of the American Chemical Society*, the flagship journal of the American Chemical Society and the

preeminent journal in the field.

The National Research Foundation (NRF) awarded higher research ratings to staff members Prof Bert Klumperman (A2) and (Emeritus) Prof Helgard Raubenheimer (B1), Associate professors Catharine Esterhuysen and Albert van Reenen (C2), with Dr Stephen Pelly being rated Y2.

Several academic researchers visited the department to collaborate with staff members and present seminars. They are: Prof Ebbe Nordlander, University of Lund (Sweden); Dr Alan Kenwright, Durham University (UK); Prof Alan Rowan, Radboud University (Netherlands); Prof Tom Simpson, University of Bristol (UK); Prof David Wright, Vanderbilt University (USA); Prof Jonathan Steed, Durham University (UK); Dr Graeme Day, University of Southampton (UK); Prof Kevin Naidoo, University of Cape Town (SA); and Prof Tadeusz Gorecki, University of Waterloo (Canada).

Academic staff members and students represented the department at several national and international conferences. Prof Klaus Koch gave a plenary lecture at the 21st Slovenian-Croatian Crystallographic Meeting, an invited lecture at the 40th International Conference on Coordination Chemistry (Spain) and a keynote lecture at the Platinum Conference: A Catalyst for Change, organised by the

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Southern African Institute of Mining and Metallurgy (South Africa).

Prof Harald Pasch was invited to present keynote lectures at the International Symposium on High Performance Liquid Phase Separations (HPLC 2012) (USA) and the first National Institute for Standards and Technology (NIST) Workshop on Macromolecular Separations-by-Design (USA). He also presented invited lectures at the Applied Polymer Chemistry (APC) Talks (Germany), ANALYTIX-2012 (China), the International Union of Pure and Applied Chemistry (IUPAC) Macro 2012 World Polymer Congress (USA), the 4th International Conference on Polyolefin Characterization (USA), and the Polymer Science Lecture Series (China).

Prof Bert Klumperman gave invited lectures at the 33rd Australasian Polymer Symposium (Australia), the Macro Group UK International Conference on Polymer Synthesis (UK), and the American Chemical Society National Meeting (USA).

The department was represented by Prof Selwyn Mapolie at the XXVth International Conference on Organometallic Chemistry (Portugal) and the 40th International Conference on Coordination Chemistry (Spain), while Prof Peter Mallon attended the POLYCHAR 20 (World Forum on Polymers and Advanced Materials) (Croatia). Dr Delia Haynes served on the organising committee of Indaba 7 (South Africa) and participated in the Gordon Research Conference on Crystal Engineering (USA). Dr Katherine de Villiers-Chen participated in the Gordon Research Conference on the Chemistry and Biology of Tetrapyrroles (USA) and Dr Robbie Luckay attended the 40th International Coordination Chemistry Conference (ICCC) (Spain).

Prof André de Villiers gave invited keynote addresses at the 12th International Symposium on Hyphenated Techniques in Chromatography (HTC-12) (Belgium), Separation Science Asia 2012 (Malaysia) and ChromSAAMS 2012 (South Africa).

Service to the scientific community

Staff members were involved as members with several national councils and organisations, particularly the South African Chemical Institute (SACI), the Society of Biological Inorganic Chemistry, the South African Crystallographic Society (SACryst), the Academy of Science of South Africa and the Royal Society of South Africa.

Membership of international organisations included the Royal Society of Chemistry (UK), the American Chemical Society, the American Crystallographic Association, the Royal Dutch Chemical Society and the International Society for Biomedical Polymers and Polymeric Biomaterials.

Prof Catharine Esterhuysen serves as a member of the South African committee of the International Union of Crystallography (IUCr), as well as president of the South African Crystallographic Society (SACrS).

Prof Peter Mallon is the chairperson of the Western Cape Section of SACI and a member of the SACI Council. Dr Gareth Arnott is a member of the board of SACI Western Cape, while Dr Margaret Blackie serves as its treasurer. Dr Arnott is also a member of the 2014 Frank Warren organising committee, responsible for putting together the next biennial South African Conference on Organic Chemistry.

Prof Klaus Koch and Prof Harald Pasch are members of the executive committee of the International Coordination Chemistry Conferences (ICCC).

Prof Mallon serves on the scientific committee of the World Forum on Advanced Materials (POLYCHAR) and is the chairman of the organising committee of POLYCHAR 22 which will take place in Stellenbosch in April 2014.

Prof Bert Klumperman is involved in a number of international committees, including the International Union of Pure and Applied Chemistry (IUPAC) Working Party on Polymerization Processes and Kinetics; the IUPAC task group on the kinetics of RAFT-polymerization; and the International Advisory Board for IUPAC's 2012 conference in Warwick (UK). He also served on the International Advisory Committee for IUPAC MACRO 2012 World Polymer Congress in Virginia (USA), the International Advisory Committee for the 2013 conference of the European Polymer Federation in Pisa (Italy), as well as on the Scientific Advisory Board for the international conference on Industrial Biotechnologies to take

place in Nanjing (China) in 2013.

Prof Mallon served on the NRF review panel of the Chemistry Thutuka programme for post-doc and early-career researchers. Dr Katherine de Villiers-Chen acted as judge at the regionals of the Eskom Expo for Young Scientists.

Staff members served on the editorial boards of a number of national and international journals. Prof Catharine Esterhuysen is a member of the editorial board of the *International Science & Technology Journal* of Namibia and Prof Willem van Otterlo is the scientific editor (Organic Chemistry) for the *South African Journal of Chemistry*. Prof Len Barbour serves on the editorial board of the *New Journal of Chemistry* and the editorial advisory board of *Crystal Engineering Communications* (both Royal Society of Chemistry journals). He was guest editor of a special themed issue of *Chemical Communications* (on CO₂ capture) and guest editor of a special themed issue of *Crystal Engineering Communications* (on macrocyclic chemistry). Prof Bert Klumperman is a member of the editorial board of *ChemZA* and of the editorial advisory board of *Transactions of the Royal Society of South Africa*. He is also the editor of the *European Polymer Journal*.

Awards to staff and students

Dr André de Villiers was named Chromatographer of the Year by the Chromatographic Society of South Africa (ChromSA) at the ChromSAAMS Conference (South Africa).

In 2012, our top female students walked away with all the student prizes. Ms Leandi van der Westhuizen received the SMM-award for the best BSc (Hons) student in Chemistry. Ms Alet van der Westhuizen, Ms Leanne Brits and Ms Nicola Steyn received Element Six DST/NRF Centre of Excellence awards for achievements in Polymer Science, and Ms Carla Egen was awarded the Jooste Postgraduate Award for Textile Science.

Staff matters

In 2012 the university's glassblower, Mr Eric Ward, reached retirement age. We were fortunate to find a replacement for this important post with the appointment of Mr Malcolm McLean. Mr Ward, a 'master' glassblower, will assist in guiding the new incumbent to achieve master glassblowing status in the next two years.

SU chemists create new separation technique

Chemists from Stellenbosch University were inspired by research dating back to the 1950s to develop a new process to make the separation of xylene (a chemical derived from crude oil) faster and more energy efficient.

This new process could benefit the production of pigments for the paint industry, fungicides, polymers and various types of plastics used today.

Dr Matteo Lusi, who until recently was a postdoctoral fellow in the Department of Chemistry and Polymer Science, carried out the research, along with Prof Len Barbour, who holds the South African Research Chair (SARChI) in Nanostructured Functional Materials at SU.

The work was published in the top chemical journal *Angewandte Chemie*, and also highlighted in news articles in *Chemistry World*, the news magazine of the Royal Society of Chemistry as well as *Chemical and Engineering News*, published by the American Chemical Society.

Dr Rehana Malgas-Enus joined the Department after the resignation of Dr Alpheus Mautjana.

Community interaction

Together with Prof Harald Pasch from Polymer Science, the department made a financial contribution to assist two learners from Kayamandi High School to participate in a science fair in China.

Collaboration

SOUTH AFRICA

Cape Peninsula University of Technology
Department of Science and Technology, South African Research Chair Initiative Programme (SARChI)
Durban University of Technology
Nelson Mandela Metropolitan University
University of Cape Town
University of Fort Hare
University of Johannesburg
University of KwaZulu-Natal
University of Pretoria
University of the Western Cape
University of the Witwatersrand
University of South Africa
Walter Sisulu University

INTERNATIONAL

Australia

Monash University
University of Western Australia

Austria

Borealis
Mondi

Belgium

Katholieke Universiteit Leuven
University of Ghent
Vrije Universiteit Brussels

Canada

University of Waterloo

Czech Republic

Technical University of Liberec

Germany

Bergische Universität GH Wuppertal
Deutsches Kunststoff Institut
Heraeus GmbH, Hanau
Leipzig University
Max Planck Institute for Colloids and Interfaces
Technical University of Munich
University of Duisburg
University of Erlangen, Nuremberg
University of Münster
University of Ulm

India

Indian Institute of Technology, Kanpur

Mauritius

University of Mauritius

The Netherlands

Delft University of Technology
Eindhoven University of Technology
University of Leiden, Gorleus Laboratory
Utrecht University

Poland

Polish Academy of Sciences

Sweden

Chalmers Institute of Technology
Lund University
Swedish Royal Institute of Technology

United Kingdom

St Andrews University, Scotland
University of Cambridge
University of Cardiff
University of Durham
University of Leeds

United States of America

Cornell University
University of California, Berkeley
University of Missouri-Kansas City
University of North Carolina
University of Southern Mississippi
University of Wisconsin, Madison

Funding

Anglo Platinum
BASF
BioPAD
Borealis
Dutch Polymer Institute
ESKOM
Harmony Gold
Heraeus GmbH, Germany
Ikusasa Chemicals
KWV
Mintek
Mondi
National Equipment Programme
National Research Foundation
Netherlands Polymer Institute
NRF Thuthuka
Plascon
SARChI
Sasol
Sastech
THRIP
Water Research Commission

Staff**Academic**

Prof KR Koch (*departmental head*)
 Dr GE Arnott
 Prof LJ Barbour
 Dr MAL Blackie
 Dr L Cronje
 Prof AJ de Villiers
 Dr K De Villiers-Chen
 Prof JLM Dillen
 Prof C Esterhuysen
 Dr WJ Gerber
 A Gericke
 Dr DA Haynes
 Prof EP Jacobs
 Prof L Klumperman
 Dr T le Roex
 Dr M le Roux
 Dr RC Luckay
 Dr M Lutz
 Prof PE Mallon
 Prof SF Mapolie
 Dr N Mautjana
 Prof H Pasch
 Dr SC Pelly
 Prof WAL van Otterlo
 Prof AJ van Reenen
 Dr PFM Verhoeven

Extraordinary professors

Prof W Hiller
 Prof WM Mackenroth
 Prof PJF Sandra

Extraordinary researcher

Dr JB McLeary

Emeritus professors

Prof BV Burger
 Prof PS Steyn
 Prof HG Raubenheimer
 Prof R Sanderson

Support staff

JG Goldie (*departmental manager*)
 JE Joubert
 SG May
 D Davids
 Dr MJ Hurndall
 MMG Cooper
 AE Fourie
 WJ Adonis
 LD Bailey
 M Bickerstaff
 MC de Jongh
 JD Groenewald
 Dr GW Harding

D Isaacs
 MC Johnson
 DJ Koen
 R Lawrence
 CW Maart
 MG Marupula
 S Mohamed
 JS Motshweni
 J Smit
 PJ Steyn
 M Taylor
 A van Zaal
 U Wanza
 E Ward
 D Wenn
 GR Willemse

NRF-rated researchers**Leading international researcher**

Prof Len Barbour
 (*functional nanostructured materials*)

Prof Bert Klumperman
 (*living radical polymerization and advanced macromolecular architectures*)

Internationally acclaimed researcher

Prof Ben Burger
 (*chemical communication in living organisms*)

Prof Harald Pasch
 (*analytical polymer science, multidimensional chromatography*)

Prof Helgard Raubenheimer
 (*ligand design aimed at applications in homogeneous catalysis; gold chemistry*)

Prof David McLachlan
 (*electrical and magnetic properties of composites*)

Prof Klaus Koch
 (*platinum group metals*)

Prof Willem van Otterlo
 (*organic synthesis and medicinal chemistry*)

Established researcher

Prof Ron Sanderson
 (*polymeric materials*)

Prof Catharine Esterhuysen
 (*intermolecular interactions*)

Prof Ed Jacobs
 (*membrane and process development*)



Dr Njabu Gule, Dr Rueben Pfkwa, Dr Nathalie Bailly and Dr Osama Bshena with their supervisor, Prof Bert Klumperman, holder of a South African Research Chair (SARChI) on Advanced Macromolecular Architectures in the Department of Chemistry and Polymer Science.

Four PhD graduates make supervisor proud

Four polymer science graduates – all sharing the same supervisor – were among the doctorate students in the Faculty of Science who received their degrees in 2012.

Dr Njabu Gule, Dr Rueben Pfkwa, Dr Nathalie Bailly and Dr Osama Bshena were all supervised by **Prof Bert Klumperman**, holder of a South African Research Chair (SARChI) on Advanced Macromolecular Architectures in the Department of Chemistry and Polymer Science.

Dr Bailly worked in the field of anti-tumour drug delivery. She developed a delivery vehicle consisting of an amphiphilic block copolymer. *In vitro* tests show very promising results in the uptake of the drug-loaded copolymer assemblies by tumour cells.

Dr Gule helped to develop the nanofibres used to develop the Stellenbosch University Water Institute teabag water filter. Antimicrobial polymer nanofibre technology developed by Dr Bshena and Prof Klumperman can be used in the air filters of hospitals to curb the spread of bacteria.

Dr Pfkwa worked on the hierarchical self-assembly of novel *para*-aryltriazole helical foldamers.

Photo: Engela Duvenage



Khumbulani Ntshidi and Abongile Hlaleleni presented their poster at the Department of Chemistry and Polymer Sciences.

Kayamandi learners tell SU chemists about their Expo project

Two learners from Kayamandi High School, who participated in a science fair in China because of their involvement in the Eskom Expo for Young Scientists, were guests of the Department of Chemistry and Polymer Science at Stellenbosch University.

Abongile Hlaleleni and **Khumbulani Ntshidi** gave a short presentation about their research project, and gave an overview of their experiences in China.

This follows the support that the two Grade 11 learners received from the Department of Chemistry and Polymer Science, which, together with other local organisations, helped to sponsor the trip.

Prof Peter Mallon
(complex polymer materials and polymer nano-composites)

Prof Selwyn Mapolie
(homogeneous catalysis via dendrimeric complexes)

Prof Albert van Reenen
(polyolefins)

Dr Robbie Luckay
(ligand design for metal ion coordination in industrial and medical applications)

NRF Prestigious Awardee

Dr James McLeary
(environmentally friendly polymers for coatings applications)

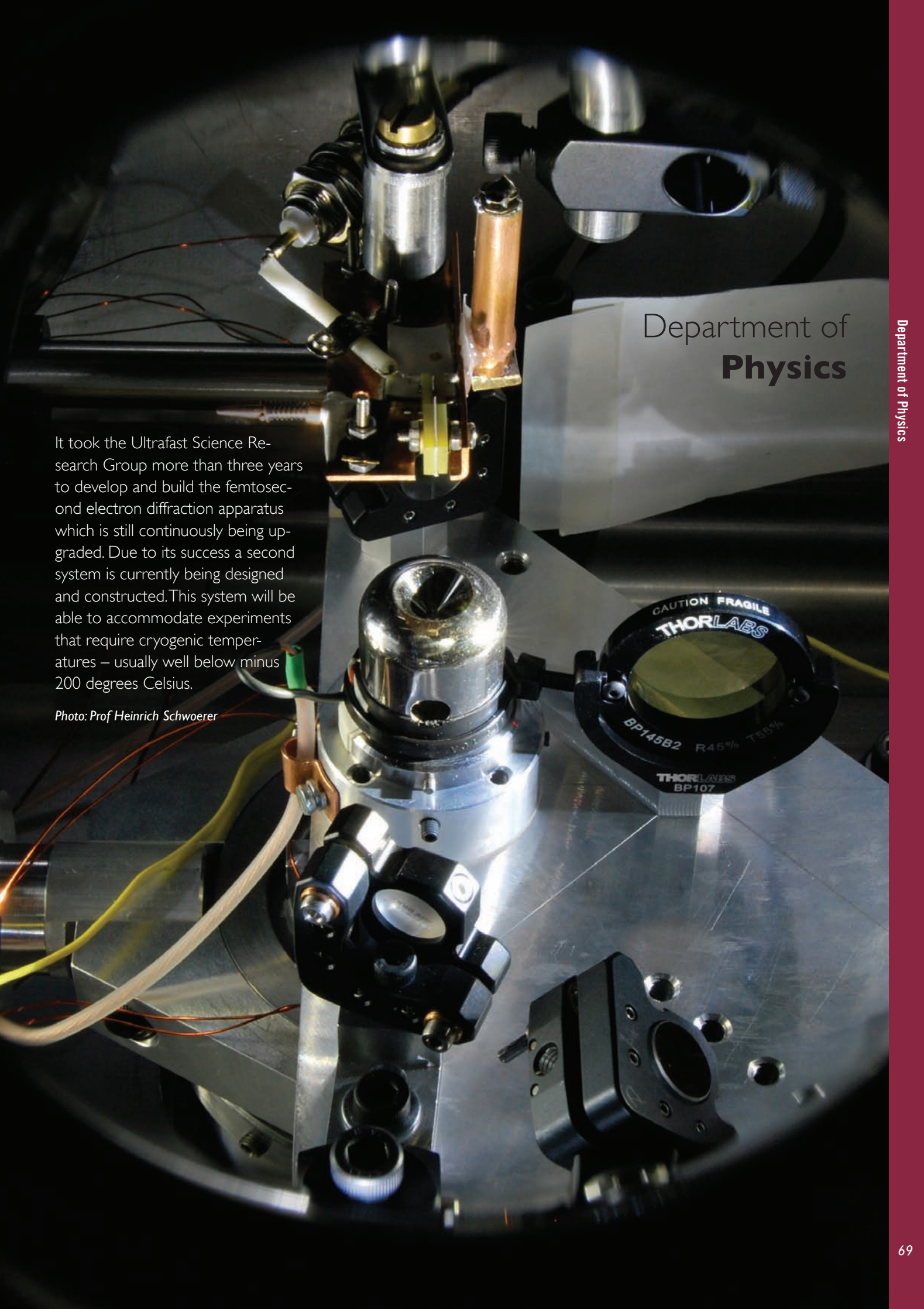
Promising young researcher

Dr André de Villiers
(separation science fundamentals and applications)

Dr Delia Haynes
(crystal engineering of non-metal containing materials)

Dr Gareth Arnott
(inherently chiral calixarenes; asymmetric methodology)

Dr Stephen Pelly
(medicinal chemistry – drug design and synthesis)



Department of Physics

It took the Ultrafast Science Research Group more than three years to develop and build the femtosecond electron diffraction apparatus which is still continuously being upgraded. Due to its success a second system is currently being designed and constructed. This system will be able to accommodate experiments that require cryogenic temperatures – usually well below minus 200 degrees Celsius.

Photo: Prof Heinrich Schwoerer

Department of **Physics**

Research Interests

Laser physics (spectroscopy and ultrafast science); nuclear physics (interaction cross-section of protons with nuclei); theoretical physics (condensed matter and complexity)

Research outputs

Articles in accredited journals	48
Books, conference proceedings, chapters in books	11
Book reviews, articles in specialist journals	1
MSc students graduated in 2012	11
PhD students graduated in 2012	5

Research highlights

The new energy research project at the Laser Research Institute unravelled fundamental light-induced charge dynamics in dye-sensitized solar cells. Working within an international collaboration – Prof Heinrich Schwoerer (SARCHI chair), Prof Derck Schlettwein from the Institute for Applied Physics at the University of Giessen (Germany), Dr Christian Litwinski from PicoQuant in Berlin (Germany) and Prof Tebello Nyokong from the chemistry department at Rhodes University (South Africa) – this activity aims for improving efficiency and applicability of novel sunlight harvesting devices.

The Ultrafast Science Research Group, led by Prof Heinrich Schwoerer, has established a world-class femtosecond electron diffraction apparatus for the investigation of structural dynamics with temporal and spatial atomic resolution. One of the highlights in 2012 in the context of molecular electronics was the observation of a structural and electronic phase transition in a strongly correlated crystal.

PhD student Ms Zikona Ndlovu took part in an experiment performed at the Joint Institute for Nuclear Research (JINR) (Russia) using neutron activation to measure trace elements of pollutants which were absorbed by mosses and lichens sampled around Stellenbosch. Ms Ndlovu received the award for the best oral presentation in nuclear

physics from the South African Institute for Physics for her work on the use of mosses and lichens to monitor air pollution in the Western Cape.

Dr Paul Papka partook in co-organising the Nuclear Spectroscopy Frontiers Workshop which was held at the iThemba LABS. Prof Shaun Wyngaardt and Prof Richard Newman organised the 3rd South Africa – JINR symposium held in Stellenbosch, as well as the 2nd South Africa – China symposium held in Somerset West. The symposium presented an opportunity for some of the foremost nuclear physicists from both countries to interact on common topics in nuclear physics and to explore opportunities for nuclear physics research in the two countries.

PhD student Mr Cobus Swartz visited Birmingham University to collaborate with Prof Martin Freer on theoretical calculations for his research on searching for the Hoyle-like state via the reaction $^{22}\text{Ne}(p,t)^{20}\text{Ne}$. Mr Jj van Zyl presented a paper entitled “Angular distributions of the analysing power in the excitation of low lying states of ^{56}Co ” at the 13th International Conference on Nuclear Reaction Mechanisms at Varenna (Italy). He presented another paper entitled “Incident-energy dependence of the analyzing power in the $^{58}\text{Ni}(p,^3\text{He})^{56}\text{Co}$ reaction between 80 and 120 MeV” at the International Conference on Nuclear Structure and Related Topics in Dubna (Russia).

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Honours students in Nuclear Physics, Ms Elsje Opperman, Mr Erasmus du Toit and Mr Wiggert Brummer took part in the SA – JINR summer practice. The group hosted several international researchers such as Prof Fedor Simkovic of the Comenius University (Slovakia), Prof Ivan Stekl of the Czech Technical University (Prague), Prof Phil Woods of the University of Edinburgh (Scotland), Prof Marina Frontasyeva of the Joint Institute for Nuclear Research (Russia), Prof Peiwen Ji and Prof Men Pu of the National Science Foundation of China.

The Laser Research Institute (LRI) was host to a number of international laser scientists who participated in research activities. One of them was Prof Herbert Stafast from the Jena Institute of Photonic Technology (IPHT) (Germany) who has been involved with vacuum ultraviolet spectroscopy and nonlinear optics for over ten years.

Other research visits were from Prof Regina de Vivie-Riedle and Prof Eberhard Riedle from Ludwig-Maximilians-Universität München (Germany), Prof Tony Parker from Rutherford Appleton Laboratories (UK), Prof Thomas Feurer of the University of Bern (Switzerland), and Dr Alexander Heidt from the Optoelectronics Research Centre at the University of Southampton (UK) and Prof Markus Schwoerer as collaborator in a project on phase transitions in organic solids funded by the Deutsche Forschungsgemeinschaft (DFG).

Prof Heinrich Schwoerer (SARCH Photonics) chaired a workshop on Ultrafast Structural Dynamics held at the Stellenbosch Institute for Advanced Studies (STIAS). Tutorial lecture series were given by Prof Konrad Samwer (Göttingen), Prof Dwayne Miller (Hamburg/Toronto), Prof Dieter Vollhardt (Augsburg), Prof Steve Johnson (Zürich), Prof Markus Schwoerer (Bayreuth), Dr Marcus Kollar (Augsburg) and Dr Günther Kassier (Hamburg).

The Optical Society of America (OSA) Student Chapter at SU hosted Prof Tom Birks from Bath University for a

workshop. The students of OSA's SU chapter, together with post graduate students in Theoretical Physics, visited ten high schools in the Western Cape during a week-long outreach programme.

PhD student Mr Nicolas Erasmus was invited to present a lecture on "Charge Density Dynamics in Tantalumdiselenite" at the 2nd Banff Meeting on Structural Dynamics in Matter (Canada). Dr Günther Kassier presented a contributed talk and a poster.

PhD student Mr Egmont Rohwer presented a poster on his solar cell project entitled "Photoinduced charge transfer between Indoline D149 and porous ZnO" at the 18th International Conference on Ultrafast Phenomena (Switzerland) and Prof Heinrich Schwoerer gave an oral presentation on the Structural Dynamics Project at the same conference.

All senior members of the Laser Research Institute (LRI) actively participated in the 5th African Laser Centre student workshop, held in Namibia. Prof Piet Walters again served as the administration organiser of the event. PhD student Mr Wilfrid Ndebeka and MSc students Mr Raphael Okoye and Mr Farooq Kyeyune gave oral presentations about their research projects. Mr Ndebeka, PhD student Mr Dirk Spangenberg and honours student Ms Thandeka Mhlanga attended the IONS-Africa I, the first conference of the International OSA Network of Students held in Africa.

Various members of the Institute of Theoretical Physics (ITP) presented their work at international conferences and workshops, as well as at the annual conference of the South African Institute of Physics, held in Pretoria. Most members of the ITP have been actively involved with some or other research activities at NITheP and in co-supervision of students. ITP students have continued contributing in Department of Physics outreach projects, including a tour in September 2012 to schools in the Overberg region as part of an outreach activity by students from the Laser Research Institute.

Another research highlight is that of Prof Herbert Weigel and Prof Hugo Reinhardt of Tübingen University (Germany), when they revisited the nature of strong interaction condensates and refuted recent claims that they were hadron rather than vacuum properties. The resulting article was published in the April 2012 edition of *Physical Review D*.

Prof Hans Eggers attended the 8th Workshop on Particle Correlations and Femtoscopy (WPCF12) at the Frankfurt Institute for Advanced Studies, followed by research visits to the Institute for High Energy Physics in Vienna (Austria) and the Max-Planck-Institut für Physik in Munich (Germany).

With colleagues from the Department of Chemistry and Polymer Science, Prof Kristian Müller-Nedebock was a co-author of a publication on sorption in porous materials published in *Angewandte Chemie*.

Other research activities included covering various aspects of condensed matter systems, and work in noncommutative formalism in quantum mechanics by Dr Hannes Kriel and Prof Frederik Scholtz.

Academic affairs

The Department of Physics had the pleasure of co-hosting with the Centre for Teaching and Learning (CTL) acclaimed physicist Prof Eric Mazur from Harvard University, and Ms Angelica Natera, Associate Director for Academic Innovation at LASPAU, a non-profit organisation affiliated with Harvard University. Prof Mazur's presentation "Confessions of a converted lecturer" was attended by staff from all faculties and followed by a work session facilitated by Ms Natera on "Promoting and sustaining teaching innovation".

MSc student Ms Andrea von Flotow and PhD student Mr Egmont Rohwer travelled to the USA to represent the Stellenbosch Laser Student Chapter at the annual meetings of the International Society for Optics and Photonics (SPIE) and of the Optical Society of America (OSA) respectively.



Prof Eric Mazur

Acclaimed Harvard physicist at SU

Stellenbosch University's Physics Department hosted the acclaimed Harvard University physicist, **Prof Eric Mazur**, for a workshop on teaching innovation on 28 May 2012.

Besides winning various awards for his work in Physics, Prof Mazur has a keen interest in teaching and is a world leader in the area of teaching innovation.

During his presentation Prof Mazur explained how he came to the astonishing conclusion that his teaching was causing students to fail, as they were just memorising information rather than learning to understand the material. He demonstrated, with supporting data, how he adjusted his teaching and how it has improved the students' performance significantly.

Service to the scientific community

Staff members were closely involved with several national councils, organisations and schools, as well as with the organising of international conferences.

Prof Frederik Scholtz is the director of the National Institute for Theoretical Physics (NITheP), while Prof Hendrik Geyer is the director of the Stellenbosch Institute for Advanced Studies (STIAS).

Prof Frederik Scholtz served on the board of the South African Institute of Physics (SAIP). He is also chair of the SAIP Theoretical Physics Division and Prof Erich Rohwer is chair of the SAIP Photonics Division.

Prof Erich Rohwer serves on the steering committee of the Photonics Initiative of South Africa (PISA). Prof Hubertus von Bergmann is a director of the African Laser Centre (ALC).

The LRI was host to the 5th African Laser Centre (ALC) Student Workshop which was organised by Prof Piet Walters. The workshop was attended by 60 students and researchers representing 17 institutions from 19 countries. The guest speakers were Prof Thomas Feurer of Bern University (Switzerland), Dr Alexander Heidt from Southampton University (UK) and Prof Mourad Zghal of the Université of Carthage (Tunisia).

Dr Paul Papka is chair of the Physics Advisory Committee for the Separated Sector Cyclotron Facility at iThemba LABS, and a member of the Physics Advisory Committee of their Materials Research Department.

The Department of Physics once again presented its annual, week-long introductory course on inductively coupled plasmas (ICP).

Awards to staff and students

Prof Heinrich Schwoerer was successful in securing the SARChI-chair in Photonics funding for another five year period.

Prof Richard Newman was nominated by a top performing first year student as the lecturer who contributed most to his success during his first academic year.

Honours student Mr Erasmus du Toit won the Meiring Naudé medal from the Faculty of Science for the best candidate in a BSc Honours programme in Physics. At the 3rd

IONS Asia conference in China, Mr Nagla Numan-Ali received the award for the best poster.

At the annual South African Institute of Physics (SAIP) conference at the University of Pretoria postgraduate students of the Department of Physics received several awards. The prize winners were Ms Melanie McLaren (best oral presentation by a PhD student in the field of Photonics), Ms Zikhona Ndlovu (best oral presentation by a PhD student in the field of Nuclear Physics), Mr Wayne Koen (best work in Applied Photonics), Mr Darryl Naidoo (best PhD presentation based on a publication), Ms Andrea von Flotow (best poster by a MSc student in the field of Photonics), Mr Riaan Coetzee (best oral presentation by a MSc student in the field of Photonics), Ms Thandeka Mhlanga (best poster presentation by an Honours student in Photonics). At a conference for postgraduate bursary students of the Square Kilometre Array (SKA) Africa, Ms Marissa Geyer was awarded the prize for the best presentation by an MSc student. Ms Chrischelle Hanekom received the Rector's Award for excellent achievement in leadership.

The efforts of our staff were recognised by the University. Ms Heleen Randall, Mr Stanley February, Prof Erich Rohwer, Dr Paul Papka, Mr J van Zyl and Mr Gerhard Louwrens received SU Rector's Performance Awards.

Staff matters

Prof Richard Newman moved from iThemba LABS to join the Nuclear Physics group as associate professor:

Dr Pieter Neethling was appointed as lecturer in the Laser group.

Prof Brandon van der Ventel and Prof Shaun Wyngaardt were promoted to associate professors and Dr Lee Boonzaaier to senior lecturer.

Prof Hubertus von Bergmann was appointed as extraordinary professor in Laser Physics.

Dr Pieter van der Westhuizen retired in March after 33 years at the department.

Community interaction

The outreach committee of the department was very active with contributions made by staff and postgraduate students to the Maties Science Winter Week, the

Stellenbosch University Open Day and the Eskom Expo for Young Scientists. Postgraduate students of the Stellenbosch Student Chapter of the Optical Society of America (OSA), which is part of the Laser Research Institute and the Institute for Theoretical Physics, visited ten schools in the Overberg region during an outreach tour of one week. They received financial support from OSA, the International Society for Optics and Photonics (SPIE), NITheP and Stellenbosch University.

The department obtained funding from the South African Agency for Science and Technology Advancement (SAASTA) to organise events to motivate students to participate in science. Undergraduate students undertook visits to iThemba LABS, the South African National Space Agency (SANSA) in Hermanus and the Institute for Marine Technology (IMT) in Simon's Town. The department also hosted learners from Oscar Mpetha High School and exposed the learners to basic techniques of data acquisition and analysis by means of a simple ticker-tape experiment. This event was co-sponsored by iThemba LABS.

Prof Richard Newman and Prof Shaun Wyngaardt, in collaboration with staff members of iThemba LABS, undertook an outreach project to Cloetesville High School, Kayamandi High School, Kylemore High School, Lückhoff High School and Paul Roos Gymnasium to introduce learners to nuclear and environmental science by measuring radon levels in their homes.

Collaboration

SOUTH AFRICA

CSIR National Laser Centre
Free State University
iThemba LABS
National Institute for Theoretical Physics (NITheP)
Rhodes University
Square Kilometre Array
University of Cape Town
University of Pretoria
University of the Western Cape

AFRICA

African Institute for Mathematical Sciences (AIMS)
African Laser Centre
Africa Theoretical Physics Programme at the Stellenbosch Institute for Advanced Study (STIAS)

INTERNATIONAL

China

School of Physics, Beijing University

Germany

Institute for Applied Physics, Giessen University
Institut für Photonische Technologien Jena e.V.
PicoQuant
University of Tübingen

India

S.N. Bose National Centre for Basic Sciences
Physical Research Laboratory (PRL), Ahmedabad

Russia

Joint Institute for Nuclear Research (JINR)

United Kingdom

Rutherford Appleton Laboratory
University of Bristol

United States of America

Syracuse University

Funding

CSIR Defence, Peace, Safety and Security (DPSS)
CSIR National Laser Centre (NLC)
Deutsche Forschungsgemeinschaft
Deutscher Akademischer Austauschdienst (DAAD)
Earth Anti-Neutrino Tomograph (EARTH) Foundation
Innovation Fund of the Department of Science and Technology
iThemba LABS
National Institute for Theoretical Physics (NITheP)
National Research Foundation
Optical Society of America
Pebble Bed Modular Reactor
Scientific Development and Integration
South African Research Chair Initiative Programme (SARChI)
Square Kilometre Array

Staff

Academic

Prof EG Rohwer (*executive head*)
Dr L Boonzaaier
C Dreyer
Dr A du Plessis
Prof HC Eggers
Prof HB Geyer
Dr H Kriel
Prof KK Müller-Nedebock
Dr PH Neethling
Prof RT Newman
Dr P Papka
Prof FG Scholtz
Prof HPH Schwoerer
Dr JA Stander
Dr CM Steenkamp
Prof BIS van der Ventel
Dr P van der Westhuizen
JJ van Zyl
Prof H Weigel
Prof SM Wyngaardt

Extraordinary professors

Dr A Avdeenkov
Dr LR Botha
Prof AA Cowley
Prof T Dlamini
Prof CA Dominguez
Prof A Forbes
Prof WD Heiss
Prof M Kastner
Prof J Meng
Prof T Parker
Dr I Snyman
Prof H Stafast
Prof HM von Bergmann

Emeritus professors

Prof PR de Kock
Prof PE Walters

Support staff

C April
DC Beukman
AS Botha
MC Botha
J Burns
SH February
JM Germishuizen
GJ Louwrens
CD Pool
DP Pool
H Randall
CJ Ruperti
EJ Shields

Theoretical physicists confirm vacuum characteristics of strong interaction condensates

SU physicist **Prof Herbert Weigel** and **Prof Hugo Reinhardt** of Tübingen University (Germany) revisited the nature of strong interaction condensates and refuted recent claims that they were hadron rather than vacuum properties. The resulting article was published in the April 2012 edition of *Physical Review D*.

Prof Weigel provided the following popular note on their work:

In Physics we distinguish between four fundamental interactions: gravitation, electromagnetism and the weak and strong nuclear forces. While gravitation and electromagnetism are experienced in everyday life, weak and strong nuclear forces are much less apparent, yet they are responsible for the formation of atomic nuclei. Even more, the components of nuclei (nucleons = protons and neutrons) are not elementary but composites of more elementary particles: the quarks and gluons. They represent the degrees of freedom for quantum chromo dynamics (QCD), the fundamental theory for the strong nuclear force. Particles that are subject to this force are called hadrons and nucleons are a particular type of hadrons.

However, QCD is a very complicated theory that evades direct solution and simpler models must be utilised to understand the formation of nucleons (and thus nuclei).

These models are to resemble as many properties of QCD as possible. A central feature of QCD is chiral symmetry. It concerns the intrinsic angular momentum (a property of rotational motion) of particles that are subject to the strong nuclear force and states that particles whose angular momenta align with, or are aligned in the opposite direction with the direction of propagation, do not interact with each other.

On the other hand, this feature does not manifest in the observed particle masses. The only way this contradiction can be resolved is by the lowest energy configuration (called vacuum) not possessing chiral symmetry. Such a vacuum property is quantified by so-called condensates, non-zero quark and gluon 'observables' which, however, do not have a particle interpretation.

In this explanation of particle masses the condensates are universal, i.e. their values are not dependent on whether or not nucleons are around. This picture has come under some dispute recently. If condensates were indeed different, they would strongly affect the description of the energy in the universe (which is far from being understood anyhow).

Recently a conception that condensates would be nucleon rather than having vacuum properties has attracted quite some attention. As a response, Reinhardt and Weigel revisited a model that unambiguously answers the question of whether a nucleon or a vacuum type configuration is present at a given point in space. In this model calculation, the condensates undoubtedly occur as vacuum properties in the sense that they indeed exist outside nucleons. However, they do undergo modification in the realm of the nucleons.

NRF-rated researchers

Internationally acclaimed researcher

Dr Alexander Avdeenko
(theoretical physics)

Prof Anthony Cowley
(nuclear physics)

Prof Hendrik Geyer
(theoretical physics)

Prof Dieter Heiss
(theoretical physics)

Prof Michael Kastner
(theoretical physics)

Prof Frederick Scholtz
(theoretical physics)

Prof Heinrich Schwöerer
(laser physics)

Prof Herbert Weigel
(theoretical physics)

Established researcher

Prof Hans Eggers
(theoretical physics)

Prof Kristian Müller-Nedebock
(theoretical physics)

Prof Erich Rohwer
(laser physics)

Dr Christene Steenkamp
(laser physics)

Prof Brandon van der Ventel
(nuclear physics)

Prof Hubertus von Bergmann
(laser physics)

Prof Shaun Wyngaardt
(nuclear physics)

Promising young researcher

Dr Paul Papka
(nuclear physics)



Department of **Physiological Sciences**

This image – taken by the state-of-the-art confocal LSM 780 microscope coupled to a super resolution ELYRA SI platform – shows a mammalian cell with detailed mitochondrial structure (red) and tubulin network morphology (green). The image is acquired through a specialised method termed super-resolution structured illumination. Both mitochondria as well as the tubulin network are implicated in many disorders. This R8 million microscope was imported from Germany, and is one of the few that has for the first time broken the limit of resolution in light microscopy.

Image courtesy of Dr Ben Loos

Department of **Physiological Sciences**

Research Interests

Metabolic syndrome, diabetes and heart diseases (myocardial ischemia, diabetic cardiomyopathy); metabolic syndrome and HIV/AIDS; muscle physiology and biology; skeletal muscle atrophy and hypertrophy; satellite cells and myoblasts; cardiac metabolism, hypoxia and ischemia; multidisciplinary stress biology; cancer and modes of cell death; neurological disorders, exercise science

Research outputs

Articles in accredited journals	16
Books, conference proceedings, chapters in books	4
MSc students graduated in 2012	8
PhD students graduated in 2012	4

Research highlights

Several staff members attended and participated in international and national conferences. Locally, Prof Faadiel Essop delivered plenary lectures at the Pre-Rural Research Day Summit as part of the AIDS Priorities Symposia series, and at the Research Symposium of the Diabetes Discovery Platform at the Medical Research Council. He also presented lectures at the 3rd Cape Winelands ANOVA Conference and at the 2nd UK – SA Cardiovascular Research Workshop held at the University of Cape Town. Prof Essop was a keynote speaker at the 40th Annual Congress of the Physiological Society of Southern Africa which was hosted by the SU Department of Physiological Sciences. Prof Essop went to Egypt to participate as a keynote speaker at the 6th International Congress of the African Association of Physiological Sciences.

Prof Kathy Myburgh presented a session at the 2012 Experimental Biology Annual Meeting held in San Diego (USA) and attended a symposium held at the American College of Sports Medicine in San Francisco (USA). She was also a symposium speaker at the 41st European Muscle Conference (Greece).

Dr Ben Loos presented a paper entitled “The membrane fusion process of autophagosomes and lysosomes” at the 50th Annual Conference of the Microscopy Society of Southern Africa.

At the 40th Annual Congress of the Physiological Society of Southern Africa, he presented a paper entitled “Cutting the edge – superresolution structured illumination microscopy in cellular physiology”.

The department produced a substantial number of peer-reviewed publications. We had 12 postgraduate students who graduated in 2012 – eight MSc and four PhD degrees – a record for the department.

Prof Anne Jonassen from the University of Bergen (Norway) spent a one-year sabbatical in the department on invitation from Prof Anna-Mart Engelbrecht which further strengthened collaborative research work between our departments. She collaborated on a project that evaluated (*in vitro* and *in vivo*) a newly identified protein with significant cardioprotective properties. Dr Bali Sishi and Dr Ben Loos were also involved in this collaboration.

Dr Ben Loos started the establishment of a new research focus on cell death susceptibility in neurodegenerative diseases. This includes: a classical cell physiology approach assessing neuronal cell death and neuronal migration; a (nano)-biophysics approach utilising superresolution structured illumination microscopy in collaboration with Prof Kristian Müller-Nedebock and Dr Leandro Boonzaaier, Department of Physics; and a systems biology approach in collaboration with Prof Jannie Hofmeyr, Department of Biochemistry.

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Dr Loos undertook a research visit to Queens College (US) to work in the laboratory of Prof Zarah Zakeri on cell death mechanisms. Dr Loos and Prof Bert Klumperman successfully applied to the National Nanotechnology Equipment Programme (NNEP) for the acquisition of an Elyra Superresolution microscope. The microscope was installed and launched in Sept 2012. It is housed in the Cell Imaging Unit in the Central Analytical Facility (CAF) and is extremely unique in its capabilities, bringing superresolution and confocal microscopy to the university

Academic affairs

Our postgraduate student population grew tremendously, with 15 Honours, 17 MSc and 12 PhD students registered to follow our programmes in 2012. This is firmly in line with our strategic objective to increase the number of students who graduate with doctoral degrees in our discipline.

Ms Gina Leisching, Ms Rudo Mapanga, Mr Jamie Imbriolo and Ms Marie van der Vyver graduated with PhD degrees. Of the eight MSc graduates, Ms Heloise le Roux, Mr Justin Mills, Ms Clare Springhorn and Ms Lize Engelbrecht received their MSc degrees cum laude.

Dr Ben Loos received funding from SU's Fund for Innovation and Research into Learning and Teaching for the compilation of a microscopy/histology book to be used in teaching.

Service to the scientific community

Prof Faadiel Essop was elected as council member of the African Association of Physiological Sciences. He also serves on the editorial boards of the *American Journal of Physiology* and the *Open Obesity Journal*, and is a member of the International Committee of the American Physiological Society.

Prof Kathy Myburgh is an international member of the organising committee of the European Muscle Conference. She was the principle organiser of the South African 2nd Stem Cell Indaba, held in Stellenbosch, and chaired a session at the NRF/SAASTA Critical Thinker's Forum on Stem Cells (Johannesburg). Prof Myburgh is Section Editor for the international journal *Bio Med*

Central Physiology and serves on the editorial board of *Medicine and Science in Sports and Exercise*.

Prof Anna-Mart Engelbrecht was elected as a member of the executive committee of the South African Society for Cardiovascular Research (SASCAR) and continued to serve on the editorial board of the *International Journal of Biomedical Sciences*. She was also the chairperson of the organising committee of the Annual Physiology Congress of the Physiology Society of Southern Africa (PSSA).

The SU Department of Physiological Sciences organised and hosted the annual Physiology Congress of the Physiology Society of Southern Africa (PSSA). The organising committee consisted of Prof Anna-Mart Engelbrecht, Mrs Grazelda Simon, Dr Theo Nel, Dr Ben Loos, Prof Kathy Myburgh and Prof Carine Smith.

Dr Nell and Prof Engelbrecht also acted as members of the NRF Evaluation Panel 2012 for the allocation of NRF bursaries and postdoctoral fellowships.

Dr Ben Loos stepped down as manager of the Cell Imaging Unit at SU's Central Analytical Facilities, but will remain involved in an advisory role with regard to microscopy experimental challenges. This includes promoting ongoing interaction between the Electron Microbeam Unit and the Cell Imaging Unit. Dr Loos is also involved with CAF training courses in fluorescence microscopy.

The annual research day for third year science students was organized by, amongst others, Dr Ben Loos. During this event postgraduate students present short talks on their research in order to share knowledge and encourage undergraduates to consider postgraduate studies in Physiological sciences.

Awards to staff and students

The excellent efforts of our staff were recognised by the university and Prof Faadiel Essop, Prof Anna-Mart Engelbrecht, Prof Kathy Myburgh and Dr De Wet Strauss received SU Rector's Performance Awards.

Prof Kathy Myburgh received an award of the American College of Sports Medicine for 25 years of membership. Dr Lydia Lacerda received the prize for the best presentation by an established researcher at the 40th Annual Meeting of the Physiology Society of Southern Africa (PSSA).

Ms Gina Leisching was the winner of the

prestigious Wyndham Student Presentation Competition at the 40th Annual Congress of the Physiology Society of Southern Africa where she competed against PhD students from all universities in South Africa. At the same congress, Ms Clare Springhorn received the first prize in the Johnny van der Walt poster competition, Ms Yogeshni Govender was awarded a merit certificate for the best MSc presentation and Ms Megan Mitchell received the award for the best presentation by an Honours student. Ms Leisching was also invited to present her work at the "New Voices in Science" day hosted by Stellenbosch University for PhD students.

PhD student Ms Kathleen Reyskens received the first prize for her presentation at the 2nd UK – SA Cardiovascular Workshop hosted by the University of Cape Town.

Several staff members of the department received new grants for research, they are: Dr Ben Loos (from the Medical Research Council; the NRF field development grant; Subcom B funding); Dr Balindiwe Sishi (from the Medical Research Council); Dr Theo Nel, Dr Annadie Krygsman and Prof Anna-Mart Engelbrecht received funding from the Cancer Association of South Africa.

Staff matters

Dr Theo Nel successfully completed his MSc Medical Science (Clinical Epidemiology) degree.

Community interaction

Dr Ben Loos and Dr Balindiwe Sishi served as adjudicators at the regional Eskom Expo for Young Scientists in Stellenbosch. Most of the staff members were involved with the annual Stellenbosch University Open Day as well as the Maties Science Winter Week.

The department again arranged the very successful hands-on winter week with the theme "Physiology is Cool" for high school learners from previously disadvantaged schools. Dr De Wet Strauss still annually presents refresher courses in Biology for teachers.

Collaboration

SOUTH AFRICA

Cape Peninsula University of Technology
Nelson Mandela Metropolitan University
University of Cape Town



Kathleen Reyskens

Student commended for study on link between ART and heart disease

Phd student **Ms Kathleen Reyskens** was commended for her research on the link between antiretroviral treatment (ART) and heart disease in HIV positive people when she was awarded first place for her presentation at the 2nd UK-SA Cardiovascular Research workshop in Cape Town, 2012.

Organised by the European Society of Cardiology (ESC), the University of Cape Town and the South African Society for Cardiovascular Research (SASCAR), the aim of the workshop was to highlight the work of young researchers in the United Kingdom and South Africa, and to promote fruitful cardiovascular research collaborations.

Under the supervision of **Prof Faadiel Essop**, leader of the Cardio-Metabolic research group in the Department of Physiological Sciences, she studied the side-effect that one specific antiretroviral therapeutic (ART) drug might have, specifically in enhancing heart disease in specific HIV positive patients.

"We need to find out what mechanisms are behind the side-effects and how the drug might be increasing a patient's risk of contracting specific heart diseases," said Ms Reyskens, who is a holder of a Harry Crossley Foundation bursary. "Ultimately, if we can find out how it works, we might be able to adapt the drug to eliminate the side-effects."

According to Prof Essop, this research is important because ARTs may further fuel the growing burden of cardio-metabolic syndrome, a combination of risk factors that predispose individuals to the future onset of type 2 diabetes and cardiovascular diseases: "It is crucial to understand better the underlying mechanisms driving these processes. Since the roll-out of ARTs has markedly improved over the last decade, associated metabolic perturbations will increasingly manifest in such individuals," he explains.

AFRICA

Kenyatta University (Kenya)
University of Botswana (Gaborone)

INTERNATIONAL

Australia

Griffith University
University of Sydney

Canada

Carleton University

France

University of La Réunion

Greece

University of Thessaly (Trikala)

Hungary

Biological Research Centre, Hungarian Academy of Science

Norway

University of Bergen

United States of America

University of North Carolina
Pepperdine University

Funding

Cancer Association of South Africa
European Union Higher Education HIV/Aids Programme (HEAIDS)
Medical Research Council
National Institutes of Health
National Research Foundation
Nestlé Nutrition Institute Africa
Norwegian Programme for Development, Research and Education (NUFU)
PepsiCo International
Stellenbosch University

Staff

Academic

Prof MF Essop (*departmental chair*)
Prof KH Myburgh
Prof A-M Engelbrecht
Prof C Smith
Dr JA deW Strauss
Dr T Nell
Dr B Loos
Dr B Sishi

Support staff

Dr A Krygsman
Dr L Lacerda
Mr A Isaacs
Mrs G Simon

NRF-rated researchers

Internationally acclaimed researcher

Prof Kathy Myburgh
(*skeletal muscle biology*)

Established researcher

Prof Faadiel Essop
(*cardiac metabolism*)

Promising young researcher

Prof Anna-Mart Engelbrecht
(*cell-death and signalling*)

A grayscale electron micrograph showing numerous rod-shaped bacteria, likely lactic acid bacteria, arranged in various orientations. The bacteria are elongated and have rounded ends, with some appearing in chains and others individually. The background is dark, making the lighter-colored bacteria stand out.

Department of **Microbiology**

Lactic acid bacteria from the genera *Lactobacillus* and *Enterococcus* are similar to the organisms *Lactobacillus plantarum* and *Enterococcus mundtii* which is used in the probiotic entiro™. This probiotic consists of living, so-called friendly lactic acid bacteria that produce small antimicrobial peptides to protect the body against pathogens. Prof Leon Dicks' research group in the Department of Microbiology at Stellenbosch University was the first in South Africa to incorporate antimicrobial peptides from lactic acid bacteria in a medical product.

Image courtesy of Prof Leon Dicks

Department of **Microbiology**

Research Interests

Bioprocessing of agricultural products; bioprospecting for enzymes that hydrolyse plant polysaccharides; genetic manipulation of yeasts for the conversion of plant material to bioethanol and production of enzymes/pharmaceutical proteins in yeast and fungi for use in vaccine production; microbiology of biomining of ores, arsenic resistance and generation of defined mutants and plasmids of biomining bacteria; taxonomy of lactic acid bacteria; characterisation of antimicrobial peptides (including bacteriocins) produced by lactic acid bacteria and their industrial application; fungal communities from fynbos soil; biology of soil fungi, particularly *Penicillium* and *Mucor*; the interactions between yeast and their biological, chemical and physical environment; taxonomy of ascomycetes (fungi); development of probiotic lactic acid bacteria for humans and animals; antibiotic resistance of waterborne pathogens; monitoring and optimisation of domestic rainwater tanks

Research outputs

Articles in accredited journals	31
Books, conference proceedings, chapters in books	2
MSc students graduated in 2012	5
PhD students graduated in 2012	4

Research highlights

Prof Leon Dicks did breakthrough research on lactic acid bacteria for which he received the prestigious TW Kambule Award at the NSTF-BHP Billiton Awards. He discovered two bacterial strains with antimicrobial peptides that are highly effective in fighting some of the major pathogens involved in topical infections and gastro-intestinal disorders. His research also led to a product marketed by Cipla Medpro as entiro™. The product is backed by 25 research papers, has been registered in 65 countries and is available from major South African pharmacies from 2013.

Prof Dicks also presented a paper at the Third International Symposium on Antimicrobial Peptides in Lille (France). Mr Tiaan Heunis and Mr Du Preez van Staden presented posters at the same symposium.

Prof Emile Van Zyl presented a paper on the development of cellulolytic yeast at the 13th International Congress on Yeasts in Madison, Wisconsin (USA) and on advanced biotechnologies for the production of aviation biofuels at the 7th Workshop on Sustainable Aviation Biofuels Brazil (SABB) in São José dos Campos (Brazil).

Dr Riaan den Haan delivered a paper on cellulolytic yeast at the 34th Symposium on Biotechnology for Fuels and Chemicals in New Orleans, Louisiana (USA).

Ms Kim Trollope in Dr Heinrich Volschenk's laboratory, presented a poster at the 6th International Congress on Biocatalysis (Biocat2012) in Hamburg (Germany). Mr Ferdinand Postma in Prof Alf Botha's laboratory, presented a poster at the 7th Congress of the International Symbiosis Society, Krakow (Poland).

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Academic affairs

After turning 50 in 2011, the Department of Microbiology shook its feathers and undertook a five-year self-evaluation process which provided an opportunity for introspection and plans for the future. With the help of external moderators, the final report highlighted the department's good research profile and high undergraduate success rates built on a strong staff component characterised by a spirit of collegiality and mutual support. Major challenges facing the department include increasing undergraduate student numbers, a decline in PhD students and sustainability issues with regard to fluctuating external funding to support research and to maintain and replace dated equipment.

Lecturers have maintained a high standard of teaching for all undergraduate courses, with an average lecturer impression mark of 77%. Teaching content is updated continuously to keep abreast of the latest developments in the field of microbiology and to relate course content to real-life examples, with many students testifying that this is what makes teaching relevant. However, coping with increasing undergraduate student numbers and underprepared students, remain daunting impediments to the quality of teaching.

In 2012, the department took part in a programme-wide recirculation exercise to reintroduce the two major-model at third year level. To be phased in during 2014, the changes to the curriculum will increase the depth of microbiology teaching at the final year level with four full modules spread over two semesters and will better prepare students for a postgraduate qualification.

The department maintains a high number of postgraduate students (11 Honours, 23 Masters and 10 PhD students) relative to the number of academic staff. Our lecturers were actively publishing their research results resulting in about three articles per lecturer.

Service to the scientific community

Prof Leon Dicks serves on the editorial boards of the *International Journal of Food Microbiology* (since 1999), the *Journal of Applied Microbiology* (2005-2012), *Letters in Applied Microbiology* (2005-2012), *Probiotics and Antimicrobial Proteins* (since 2008), *Beneficial Microbes* (since 2008) and the *Bioscience of Microbiota, Food and Health*

journal (since 2011). He is editor in chief of the *South African Journal of Enology and Viticulture*.

Prof Karin Jacobs serves as the vice-president of the African Mycological Association and is a member of the editorial board of *Mycology*.

Prof Alf Botha was elected as member of the Academy of Science of South Africa (ASSAf), joining Profs Doug Rawlings, Bernard Prior, Emile van Zyl, and Leon Dicks as members of the Academy. Prof Botha is also a member of the editorial board of the *Canadian Journal of Microbiology* and *FEMS Yeast Research* and a member of the Materials Research Group (MRG) Users Advisory Committee at iThemba Laboratories.

Prof Emile van Zyl continued as member of the Advisory Board of the Bioimprove programme in Sweden. Dr Heinrich Volschenk is a council member of the South African Society for Microbiology (SASM).

Awards to staff and students

Prof Leon Dicks was awarded the prestigious TW Kambule Award at the NSTF-BHP Billiton Awards for his breakthrough research on lactic acid bacteria.

Prof Emile van Zyl was runner-up for the 2012 Energy Award from the South African National Energy Association (SANAE). Prof Alf Botha and co-authors received the Douw Greeff prize for the best paper published during 2011 in the journal *Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie*. This prize is awarded annually by the South African Academy for Science and Arts for a research or review article of outstanding scientific quality.

Staff matters

Prof Emile van Zyl started as the fifth chair of the Department of Microbiology whilst Prof Doug Rawlings acted as Vice-Rector: Research for six months. When Prof Eugene Cloete, dean of the Faculty of Science and also a member of the department was elected as the new Vice-Rector: Research & Innovation, Prof Rawlings took up the position of acting dean of the Faculty of Science.

Community interaction

Prof Emile van Zyl, Senior Chair Biofuels, presented scientific and informal

seminars, including a presentation to the U3A Helderberg, titled "Sustainable biofuel production in Southern Africa: Opportunities and Challenges." U3A stands for University of the Third Age, a worldwide network of learning communities for older people.

The department participated in a project at the Kleinmond Housing Project to broaden knowledge about the quality of harvested rainwater in South Africa. Funded by the Water Research Commission, Ms Penelope Dobrowsky, Dr Michele de Kwaadsteniet and Dr Wesaal Khan, under the leadership of Prof Eugene Cloete, found that while the chemical quality of the rainwater was generally lower than the stipulated drinking water guidelines, the microbial analysis indicated that the water in the domestic rainwater harvesting tanks should not be used for potable and certain domestic purposes.

Ms Dominique Mannel from the Department of Sociology and a research assistant at the SU Water Institute, investigated the acceptance and perception on the use of the domestic rainwater harvesting tanks by interviewing 68 households. The Kleinmond Housing Project is an initiative of the Council for Scientific and Industrial Research (CSIR) and the Department of Science and Technology (DST). Research is continuing to improve the microbial quality of harvested rainwater to within potable standards through the implementation of point-of-use treatment technologies, such as filter or solar disinfection systems.

MSc student Ms Veronique Meyer assisted learners at her former high school, Lückhoff High School in Stellenbosch, with gaining practical experience in water testing.

Dr Michele de Kwaadsteniet and Mrs Louisa van der Westhuizen served as regional judges at the 2012 Eskom Expo for Young Scientists and Ms Jenade Lynch and Dr Wesaal Khan provided technical assistance to pupils preparing for this event.

Dr Khan and Dr Heinrich Volschenk coordinated the department's involvement with regard to University Open Days, the Maties Science Winter Week and other ad hoc visits by high school learners. These well-coordinated interactions raised learners' interest in microbiology and are partly responsible for increased enrolment in recent years.

SU scientists develop a high-tech 'tea bag' filter for cleaner water

When microbiologist **Prof Eugene Cloete** became Dean of the Faculty of Science at Stellenbosch University (SU) in January 2009, he did not allow his expanded administrative duties to overwhelm his passion for his subject. To the contrary, he picked up on relevant research outside his own field of expertise, which sparked the invention of a high-tech disposable filter that looks like a tea bag and cleans polluted water.

Together with researchers from the Department of Microbiology and SU polymer scientists, he patented the innovative invention in 2012 – a portable, easy-to-use and environmentally-friendly water filter bag that fits into the neck of a bottle.

"The water is cleaned right then and there when you drink from the bottle," Cloete explains.

The sachet combines years of fundamental research on water purification, nanotechnology and food microbiology in a practical way. It promises to provide easy access to clean drinking water for vulnerable communities, for instance those living near polluted water streams.

Prof Cloete, who is also Chairperson of the SU Water Institute, says he got the idea for the filter on an introductory visit to InnovUS, the University's technology transfer company. "I was shown the electro-spinning technique of spinning ultra-thin fibres on a nanoscale developed by Dr Eugene Smit of the Department of Chemistry and Polymer Science," he remembers.

A research team was put together and after various trials and experiments, a filter sachet was developed that not only resembles a tea bag in shape and size, but is made of the same biodegradable material as off-the-shelf rooibos tea bags.

The Stellenbosch University Water Institute and its "tea bag" water filter form part of SU's HOPE Project, a set of development goals aimed at improving lives in South Africa and the rest of the continent.

Collaboration

SOUTH AFRICA

Agricultural Research Council, Nietvoorbij
Cape Peninsula University of Technology
Council for Scientific and Industrial Research
Medical Research Council
Polytechnic of Namibia
Rhodes University
University of the Western Cape
Water Research Commission

INTERNATIONAL Chile

Andrés Bello University

Germany

Karlsruhe Institute of Technology

Finland

University of Turku

France

Muséum national d'Histoire naturelle

Italy

University of Padova
University of Verona

Japan

Kyushu University
Tokyo University of Agriculture
The University of Tokyo

Netherland

Centraal Bureau voor Schimmelcultures

Sweden

Umeå University

United States of America

Dartmouth College
Rutgers, State University of New Jersey

Wales

Bangor University

Funding

Cipla Medpro
Department of Science and Technology
Mascoma Corporation
National Research Foundation
Polytechnic of Namibia
RAPS GmbH & Co
Sloan Trust
South African National Energy Research Institute
Technology and Human Resources for Industry Programme
Technology Innovation Agency
Water Research Commission

Staff

Academic

Prof WH van Zyl (*departmental chair*)
Prof M Bloom
Prof A Botha
Prof TE Cloete (*vice-rector: research and innovation*)
Prof LMT Dicks
Prof K Jacobs
T Jansen
Dr W Kahn
Prof DE Rawlings (*acting dean*)
Dr H Volschenk

Extraordinary professors

Prof B Axcell
Prof L Lynd
Prof BA Prior
Prof J Thevelein
Prof D Toerien

Support staff

L J Daniels
M Gey van Pittius
MH Koopman
J Lynch
LA Malherbe
R Robyn
M Stuurman
T van der Merwe
L van der Westhuizen
W Wentzel

NRF-rated researchers

Leading international researcher

Prof Doug Rawlings
(*molecular biology of biomining bacteria and their plasmids*)

Internationally acclaimed researcher

Prof Alf Botha
(*yeast and fungal ecology*)

Prof Eugene Cloete
(*water biotechnology*)

Prof Leon Dicks
(*lactic acid bacteria, probiotics and bacteriocins*)

Prof Emile van Zyl
(*bioethanol from plant material and production of proteins in yeast and fungi*)


Established researcher

Prof Marinda Bloom
(*fungal bioprocessing*)

Prof Karin Jacobs
(*microbial ecology*)

Dr Heinrich Volschenk
(*bioprospecting for enzymes and production of proteins in yeast*)

Department of **Botany and Zoology**



The beetle daisy (*Gorteria diffusa*) commonly grows in the south of Namibia, Namaqualand and the Little Karoo. Remarkably, one finds fourteen different floral forms or 'types' of this one species of daisy. They vary in colour from bright orange to light yellow, and most of these flower forms also have insect-like black spots on them. Studying the interaction between pollinators and plants in the Cape flora, researchers from the Stellenbosch University found that the male and female bee fly (*Megapalpus capensis*) have different preferences when it comes to their favourite daisy. The research was published in the international journal *Functional Ecology*.

Photo: Dr Marinus de Jager and Ethan Newman

Department of **Botany and Zoology**

Research Interests

Animal biodiversity; Antarctic and southern island research; behavioural ecology of vertebrates; Cape flora; climate change; community ecology; economic botany; conservation genetics and phylogeography; ecotoxicology; ecotoxicogenomics; endocrine disruption; evolutionary genomics of animals; evolutionary physiology of animals; fynbos ecology and genomics; herpetology; indigenous plant use and medicinal plants; insect behaviour and physiology; ecophysiology; invasion biology; macroecology; molecular systematics; palaeontology; plant animal interactions; plant biodiversity; plant biochemistry; plant biotechnology; plant ecology; plant ecophysiology; plant physiology and photosynthesis; plant functional genomics; plant mycorrhiza-fungi; plant systematics; stress ecology; vertebrate functional biology.

Research outputs

Articles in accredited journals	133
Editorial activities (books and journals)	54
Books, conference proceedings, chapters in books	14
MSc students graduated in 2012	12
PhD students graduated in 2012	11

Research highlights

The department and associated staff take pride in the fact that the majority of the research papers were published in ISI accredited journals with high impact factors. Members of the Department of Botany and Zoology received more than R10 million in the form of research funding.

More than seventy percent of the academic staff now have NRF ratings (A = 3; B = 1; C = 6; Y = 9). As a result of the active research programmes of the department and the Centre for Invasion Biology, 37 new students registered for postgraduate degrees in Botany or Zoology (15 honours; 15 MSc and seven PhD). We also attracted many prominent national and international visitors and provided an academic home to 13 postdoctoral fellows from four nationalities.

Through these active collaborations we hosted visits from Dr Robert Barclay from the University of Calgary (Canada), Prof Jaimie Dick and Prof Mhairi Alexander of Queens University (Ireland), Prof Susan Mazer of the University of California (USA), Prof Eric Imbert from the *Institut des Science de l'Évolution de Montpellier* (France), Dr Heather Whitney of Bristol University (UK) and Dr Andrea Cosocov from the University of Cordoba (Argentina). Other visitors were Dr Sara Aguado de la Paz of the University of Oviedo (Spain), Dr Michelle Greve from Aarhus University (Denmark), Prof Steven

Karl of the Hawai'i Institute of Marine Biology (USA), Dr Christine Meynard from the *Centre de Biologie pour la Gestion des Populations* (France) and Prof Michael Udvardi of the Noble Foundation in Oklahoma (USA).

Our seminar programme attracted several national research presenters such as Dr Woody Cotterill of the Africa Earth Observatory Network (AEON), Dr Lara Atkinson of the South African Environmental Observation Network (SAEON), Dr Lara van Niekerk of the CSIR Estuaries and National Biodiversity Assessment, Mr Saberi Marais of InnovUS and Dr Laura Blamey of the Marine Institute at the University of Cape Town.

Academic staff of the department and the C•I•B attended and presented research at several national and international conferences. International contributions include Dr Alex Valentine who visited the National University of Mexico and the Nobel Foundation in Oklahoma (USA), Dr Sophie von der Heyden who visited the National Evolutionary Synthesis Centre at Duke University (USA) and Dr Susana Clusella-Trullas who was an invited seminar speaker at the Department of Zoophysiology at Aarhus University (Denmark).

Dr Tammy Robinson presented at the 1st International Conference on the Regulation of Invasive Species of South Africa and Germany at the Justus Liebig University (Germany). Prof Dave

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Richardson, Dr John Wilson and Dr Cang Hui attended the Tree Invasion Workshop at Bariloche (Argentina) and Prof Conrad Matthee and Prof Terry Robinson visited collaborators at the University of Montpellier (France) for on-going research. Dr Cang Hui visited collaborators at CSIRO and Monash University (Australia) and Prof Dave Richardson attended the NEOBLOTA conference in Pontevedra (Spain).

The Department of Botany and Zoology is the home of choice for several research associates who contribute towards research productivity. They include Prof Jan Nel, Prof Eddie van Dijk, Prof Jan Giliomee, Prof Dan Baird, Prof Sophie Reinecke, Prof Koot Reinecke, Dr Ted Oliver, Dr Edmund Pool, Dr Willie Sirgel, Dr Krystal Tolley, Dr John Wilson and Dr Colin Tillbury.

Academic affairs

At undergraduate level, the department is responsible for teaching six modules in Biology (first year) and 12 modules in Biodiversity and Ecology (second and third year). Some of the first year modules are taught as service courses to large numbers of students from other faculties. In this respect teaching assistance was provided by Dr Juri van den Heever, Dr Marnel Mouton, Dr W le Roux, Dr Sjirk Geerts, Dr Kenneth Oberlander, Mr Marinus de Jager, Mr Hannibal Musarurwa, Mr Christoff Truter, Mr Edward Archer, Mr Bernard Coetzee, Ms Janine Colling and Ms Natasha Mothapo.

The revised Biodiversity and Ecology programme was implemented during 2012. The new programme will increase the number of undergraduate modules on offer from 18 to 20 during 2013, and two new modules (Invasion Biology and Biome Ecology) will be introduced as third year modules during 2014. The changed programme will allow undergraduate students more exposure to the field of biodiversity and ecology. The content of the undergraduate programme is specifically designed to provide a solid platform for postgraduate studies in Botany and Zoology with emphasis on biodiversity, evolution and ecology. The new third year modules for 2013 include an Ecology Field Course, Angiosperm Diversity and Evolution, Global Change Biology,

Evolutionary Ecology, Evolutionary Patterns and Processes, and Conservation Biology.

The department continued with the interactive tutorial system for small groups of first year students who have different levels of competency. The additional teaching is presented once a week by 11 dedicated senior postgraduate students in the form of formal tutorial classes. The same tutors are available for regular consultations with individual students. The programme, co-ordinated by Prof Theresa Wossler, proved to be very successful. Despite the larger class sizes the pass rate of first year students in most courses increased significantly since the introduction of this programme.

Thirty-seven postgraduate students successfully completed their degrees in the department (14 Honours, 12 MSc and 11 PhD). At present there are 39 Master's and 33 PhD students registered in the department. Fifteen MSc and six PhD students successfully presented project proposals during 2012. Three proposals to upgrade from MSc to PhD were evaluated and approved by the academic committees of the department.

Service to the scientific community

Several staff members acted as external examiners for courses or served on advisory panels to various conservation and government bodies.

The staff members of the Department of Botany and Zoology who acted as external examiners included Dr Carol Simon (Cape Peninsula University of Technology), Dr Nokwanda Makunga (University of the Free State and the University of Cape Town), Prof le Fras Mouton (University of the Free State and the University of the Western Cape), Prof Theresa Wossler (Rhodes University), Prof Hannes van Wyk (University of the Western Cape and the University of Cape Town), Dr Alex Flemming (University of the Western Cape and the University of Cape Town), Dr Tammy Robinson (University of Cape Town), Prof Valdon Smith (University of the Western Cape).

Prof Michael Cherry served as a panel member of the National Research Foundation (NRF) for the allocation of grants in Zoology and Ecology, as well as a trustee for the Kalahari Research Trust. Dr Allan Ellis served as board secretary of the South African Association of Botanists

(SAAB) and supervised two NRF interns. Dr Carol Simon acted as a consultant for an abalone farm and served as representative on the International Polychaete Association.

Dr Nokwanda Makunga served as the president of the South African Association of Botanists (SAAB) and on the scientific committee of the Medical Research Council's Research Day. She was the invited speaker at SciFest 2012 as part of the National Science and Technology Forum roadshow in Grahamstown, and was invited as a member of the delegation that accompanied the Department of Science and Technology (Indigenous Knowledge Systems Platform) to India. She is the principal investigator for a THRIP-funded grant in partnership with Footprint Management Solutions.

Dr Alex Valentine was on the advisory board of JS Marais Park, while Prof le Fras Mouton was frequently interviewed as part of the RSG Afrikaans radio programme "Hoe verklaar jy dit?". Prof Terry Robinson served as an assessor at the National Research Foundation (NRF), was a board member of the International Cytogenetic and Genome Society and served as an executive and founding board member of the World Lagomorph Society. Prof Theresa Wossler was an active member of the Helderberg Advisory Committee which makes recommendations about issues such as fire management, animal translocations and public concerns to the management committee of the Helderberg Nature Reserve in Somerset West (South Africa).

Prof Hannes van Wyk served on the programme committee for the Berlin 10 International Conference, the organising committee of the International Symposium on Toxicity Assessment and on the steering committee of the Water Research Council. He was also a member of the evaluation panel for the Junior Captain Scott Medal. Prof Conrad Matthee was a member of the Riverine Rabbit Working Group Steering Committee of the Endangered Wildlife Trust. Dr Anton Pauw served as a trustee of the Wildflower Conservation Trust, was a member of the Red Hill Conservation Group, and was interviewed for the BBC Series "Wonders of Life". Dr Sophie von der Heyden's book, the *Southern African Sea Life – A Guide for Young Explorers*, was published by STRUIK.

Prof Leanne Dreyer acted as a scientific consultant to the *Woordeboek van die Afrikaanse Taal* (WAT) and was a core member of the DST-NRF Centre of Excellence in Tree Health Biotechnology.

Photo: Engela Duvenage



C•I•B technical officer Thembile Khoza showed Minister Naledi Pandor some of the ant samples that have been collected as part of the limbovane Outreach Project to Western Cape schools.

Science and Technology Minister Pandor visits C•I•B

The Minister of Science and Technology, **Ms Naledi Pandor**, received an impressive snapshot of the globally significant activities and endeavours of the DST-NRF Centre of Excellence for Invasion Biology (C•I•B) when she recently visited the Stellenbosch University campus.

The Minister, along with **Dr Albert van Jaarsveld**, President and CEO of the National Research Foundation (NRF) and other key NRF officials, spent the morning in the company of SU Rector **Prof Russel Botman**, the acting SU Vice Rector: Research **Prof Douglas Rawlings**, Faculty of Science Dean **Prof Eugene Cloete** and staff members of the C•I•B.

The C•I•B is one of seven Centres of Excellence established nationally by the Department of Science and Technology and the National Research Foundation since 2004. Its members undertake research on the impact that invasive species have on biodiversity and ecological services such as water provision.

Invasive species are organisms that have either accidentally or intentionally been transferred outside of their original area of occurrence, and now cause biodiversity damage and/or economic harm. It is estimated that the economic cost of the impact of invasive species is 5% of the global gross domestic product (GDP).

During her visit, Minister Pandor also heard about how the C•I•B is using ants as the theme of its limbovane high school education project to inspire a new generation of young scientists.

Ms Pandor said she was pleased to have had the opportunity to visit the Centre along with her team. She encouraged staff involved to continue their dedicated work and to do even more to ensure that their work will have an impact on science and society.

Prof Savel Daniels served on the National Research Foundation (NRF) postdoctoral panel, while Dr Victor Rambau served on the committee for the Zoological Society of Southern Africa. Dr Tammy Robinson served on the board for the reviewing of funding applications for the NRF's Thuthuka fund.

Staff members were also actively involved in editorial activities for several prestigious journals. These include: Prof Michael Cherry (*Behavioral Processes; Folia Zoologica and Emu*; and editor-in-chief of *SA Journal of Science*), Dr Allan Ellis (associate editor of the *Botanical Journal of the Linnaen Society*), Dr Carol Simon (editor of the newsletter of the Zoological Society of Southern Africa), Dr Makwanda Makunga (associate editor of the *South African Journal of Botany*), Dr Alex Valentine (*African Journal of Herpetology* and associate editor of *African Zoology*), Prof Terry Robinson (*Chromosome Research; Cytogenetics and Genome Research*; and *Heredity* and co-edited with dr F Yang a special issue for *Heredity* entitled "Molecular Cytogenetics: Karotype evolution, phylogenomics and future prospects"), Prof Theresa Wossler (assistant editor of *African Entomology*), Prof Hannes van Wyk (editor of *African Zoology*), Prof Conrad Matthee (*Integrative and Comparative Biology; Koedoe and African Journal of Marine Science*), Dr Anton Pauw (subject editor for the *South African Journal of Botany*), Dr Susana Clusella-Trullas (*Journal of Thermal Biology; Frontiers in Invertebrate Physiology and Austral Ecology*), Dr Cang Hui (*Biological Invasions; Applied Mathematical and Computational Sciences; The Open Zoology Journal*, and *The Scientific World Journal*), Dr Jaco le Roux (review panel for *Czech Science*, and associate editor of *Biological Invasions*), and Prof Valdon Smith (*Polar Record*).

Several staff members are active in the organisational or decision-making structures of various service organisations. These include the South African Association of Botanists (SAAB), the Agricultural Research Council (ARC), the Task Team for the Development and Regulation of Alien Species under the South African Biodiversity Act, the Scientific Committee on Antarctic Research (SCAR), the Zoological Society of Southern Africa (ZSSA), the South African Council for Natural Scientific Professions (SACNSP), the South African National Biodiversity Institute (SANBI), the National Research Foundation Biodiversity Focus Panel, the South African Society for Systematic Biology Council (SASSB), the Global Biodiversity Information Facility, the Lagomorph Specialist Group, the Onderstepoort

Veterinary Research Institute, the Kalahari Research Trust, the Riverine Rabbit Working Group Steering Committee, the Water Research Commission steering committee, the Junior Captain Scott panel of the South African Academy for Science and Art, and the Southern African Reptile Conservation Assessment (SARCA).

Some of the international service organisations we are associated with include the Australian Antarctic Division, the Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO) (Netherlands), the Committee for Research and Exploration of the National Geographic Society (USA), the International Union for the Conservation of Nature, the Amphibian Panel of the European Union's Organisation for Economic Cooperation and Development, the UK National Environmental Research Council, and the Institute for Ecological Research (Netherlands).

Awards to staff and students

Several of our staff members were honoured for their work. Dr Bruce Anderson received an Oppenheimer Scholarship and went on a research sabbatical to Japan. Prof Savel Daniels received Oppenheimer and Fulbright Scholarships for his research trip to Harvard University.

Prof Terry Robinson received acclaim for his role in the compilation of the most comprehensive family tree for mammals yet, published in January 2012 in the leading academic journal *Science*. Prof Michael Cherry was elected to the Academy of Science of South Africa and Prof Theresa Wossler was elected to the committee for Teaching and Learning at SU.

Our students, in collaboration with their supervisors, received various awards for their work. Mr Bernard Coetzee (supervised by Prof Steven Chown) won the prize for the best student presentation at the 3rd European Congress of Conservation Biology, while Ms Genevieve Thompson (supervised by Prof Dave Richardson, Dr Jaco Le Roux and Dr John Wilson) delivered the best PhD presentation at the meeting of the South African Association for Botanists (SAAB). Ms Nina du Toit (supervised by Prof Conrad Matthee, Prof Bettine Jansen van Vuuren and Dr Sonja Matthee) delivered the best presentation by a doctoral student at the 10th meeting of the Southern African Society for Systematic Biology. Mr

Adriaan Engelbrecht (supervised by Dr Sonja Matthee and Prof Conrad Matthee) walked away with the 3rd prize at the same conference. Ms Natasha Mothapo (supervised by Prof Theresa Wossler) and Mr Marinus de Jager (supervised by Dr Allan Ellis) were selected out of 60 students to present their work at the 2012 New Voices in Science conference at SU.

Staff matters

Dr Jaco le Roux, a molecular invasion biologist, was appointed as lecturer from 1 January 2012 and Dr Susana Clusella-Trullas as senior lecturer as from 1 October 2012. We had to bid farewell to Dr Sue Jackson who resigned as academic lecturer, but will continue her affiliation with the department as research associate. Ms Judy Smith resigned as from November 2012 after five years of service. Prof Steven Chown (professor in Botany and Zoology and director of the C•I•B) accepted an appointment at Monash University, Australia, but continues his involvement with the department as an extraordinary professor. Prof Dave Richardson was appointed as new director of the Centre for Invasion Biology.

Community interaction

A number of lecturers were involved in the Maties Science WinterWeek. Under the leadership of Prof Leanne Dreyer learners were made aware of the sustainable use of biodiversity for commercial and cultural benefits.

The C•I•B limbovane project continued to be very successful in teaching biodiversity to teachers and high school learners. This outstanding project received the attention of Minister Naledi Pador during a visit to the department on 21 February 2012

Collaboration

SOUTH AFRICA

Agricultural Research Council, Infruitec-Nietvoorbij
Agricultural Research Council, Pretoria
CapeNature
Cape Peninsula University of Technology
Council for Scientific and Industrial Research (CSIR)
CSIR Natural Resources and the Environment research unit
Department of Agriculture, Forestry and Fisheries
Department of Environmental Affairs DST-NRF Centre of Excellence in Tree Health Biotechnology
Endangered Wildlife Trust

Forestry and Agricultural Biotechnology Institute
Iziko South African Museum
Medical Research Council
Nelson Mandela Metropolitan University
Northwest University
Perishable Products Export Control Board
Plant Protection Research Institute
Rhodes University
Sasol Technology
South African Institute of Aquatic Biodiversity
South African National Biodiversity Institute
South African National Parks
University of Cape Town
University of KwaZulu-Natal
University of Pretoria
University of Pretoria, Faculty of Veterinary Science
University of the Free State
University of Venda
University of the Western Cape
Working for Water Programme

INTERNATIONAL

Argentina

University of Cordoba
University of Rio Cuarto

Australia

Australian Antarctic Division
Australian Centre for Evolutionary Biology and Biodiversity, University of Adelaide
Australian National University
Commonwealth Scientific and Industrial Research Organisation
Curtin University of Technology
Department of Environment and Conservation, Western Australia
James Cook University
Kings Park and Botanic Garden
Macquarie University
School of Earth and Environmental Sciences, University of Adelaide
University of Adelaide
University of Melbourne
University of New South Wales
University of Queensland
University of Sydney

Belgium

Flanders Institute for Biotechnology, University of Ghent

Brazil

Universidade Federal de Santa Catarina

Canada

Simon Fraser University
University of Toronto

China

Guangdong University of Technology



Prof Dave Richardson was also honoured with the FW Herschel Medal of the Royal Society of South Africa.

Invasion biologist to serve as Professor-at-Large

The appointment of **Prof Dave Richardson**, director of the Centre for Invasion Biology (C•I•B), as a James March Professor-at-Large at the University of Vermont (UV), is another feather in his cap. His appointment at this premier small research university, one of the USA's best, comes just weeks after he received the John FW Herschel Medal from the Royal Society of South Africa.

Prof Richardson studies the dynamics of plant invasions and is an international authority on trees and shrubs as invasive species. Much of his work aims to provide practical guidelines to improve the management of invasive species, but he also contributes to theoretical frameworks and general models to understand the dynamics of invasions.

According to the University of Vermont, Professors-at-Large are expected to "invigorate the intellectual and cultural life of the University." Incumbents of this position are not only selected for their high accomplishments, but "also for their broad-ranging interests and their personal and professional accessibility". Professors-at-Large, of which no more than 20 are appointed during one period at Vermont, typically offer public lectures and collaborate and consult with students.

His appointment at UV is for seven years, during which this A-rated scientist will visit Burlington for up to four residency periods of several weeks each.

Maties receive prizes for parasite studies

Two doctoral students from Stellenbosch University (SU) – both with a particular preference for the study of parasites – were awarded prizes at the 10th conference of the Southern African Society for Systematic Biology (SASSB), held in Arniston. **Ms Nina du Toit** delivered the best presentation by a doctoral student, while **Mr Adrian Engelbrecht** took third place in this category.

The SASSB is aimed at promoting systematics and taxonomy in South Africa and is multi-disciplinary in nature.

The two students share the same supervisors – **Prof Conrad Matthee**, head of the Department of Botany and Zoology, whose research programme focuses on molecular systematics and population genetics, and **Dr Sonja Matthee** of the Department of Conservation Ecology and Entomology, who in turn studies the taxonomy and ecology of parasites.

Ms Du Toit is busy with an extensive phylogeographical study of the striped mouse (*Rhabdomys pumilio*), focusing specifically on the parasitic louse (*Polyplax arvicantis*) that only occurs on this rodent.

Mr Engelbrecht is focusing on a parasitic mite (*Laelaps giganteus*) that is believed to occur on various types of small rodents in Southern Africa.

As it is not currently clear how host specific *Laelaps giganteus* actually is, Mr Engelbrecht's study should provide, among other things, more concrete evidence in this regard.

According to Dr Matthee very little research has been done on the phylogeography or genetic distribution of certain African species of parasites.

Hefei University of Technology
Lanzhou University

Czech Republic

Academy of Sciences of the Czech Republic
Botanical Institute
Charles University
Veterinary Research Institute, Brno

Denmark

Aarhus University
University of Copenhagen

Finland

University of Jyväskylä

France

Centre de Biologie pour la Gestion des Populations, Université Montpellier II
Centre d'Ecologie Fonctionnelle et Evolutive
Institut des Sciences de l'Evolution, Université Montpellier II
Institut National de l'Environnement Industriel et des Risques
Musée national d'Histoire naturelle
National Centre for Scientific Research (CNRS)
Université de Franche-Comte
Université Montpellier I
Université Paul Sabatier Toulouse III

Germany

Alfred Wegener Institute for Polar and Marine Research
University of Braunschweig
University of Freiburg
University of Hamburg
University of Leipzig
University of Würzburg

Greece

Agricultural University of Athens

Hungary

Hungarian Academy of Sciences

India

India Institute of Science

Iran

Tarbiat Modares University

Italy

University of Bologna
University of Siena

Japan

Kyoto University
National Institute for Basic Biology

Kenya

University of Nairobi

Mexico

National University of Mexico

The Netherlands

Data-Analyse Ecologie
Wageningen University

New Zealand

University of Auckland

Norway

University of Oslo

Poland

Jagiellonian University
Institute of Botany, Polish Academy of Sciences

Portugal

Instituto Superior de Psicologia Aplicada
Technical University of Lisbon
University of Evora

Spain

Centre Tecnològic Forestal de Catalunya
Doñana Biological Station
National Museum of Natural Sciences
Universidad de Oviedo
Universidad Pablo de Olavide
Universitat Autònoma de Barcelona
Universitat de Girona
Universitat de València

Sweden

Lund University
Stockholm University
Swedish University of Agricultural Sciences

Switzerland

University of Zurich

United Kingdom

British Antarctic Survey
British Trust for Ornithology
Plymouth Marine Laboratory
Queen Mary College, University of London
Royal Botanic Gardens, Kew
The Wellcome Trust Sanger Institute
University of Bristol
University of Cambridge
University of Exeter
University of Sheffield

United States of America

Cornell University
Field Museum Chicago
Nobel Foundation
University of California (Berkeley)
University of California (Santa Cruz)
University of South Georgia
University of Vermont
University of Villanova

University of Wisconsin
West Virginia University

Funding

British Ecological Society
Claude Leon Foundation
National Centre for Scientific Research (CNRS),
France
Council for Scientific and Industrial Research (CSIR)
Department of Agriculture, Forestry and Fisheries
Ernst Oppenheimer Fellowship Trust Fund
German Academic Exchange Service (DAAD)
University of Montpellier, France
National Geographic Society of America
National Natural Science Foundation of China (NSFC)
National Research Foundation
Oppenheimer Memorial Trust
Royal Society, United Kingdom
Sasol Technology
South African Biodiversity Initiative
Stellenbosch University
Table Mountain Fund
Thuthuka
Water Research Commission
Working for Water Programme
World Wide Fund for Nature

Staff

Academic

Prof CA Matthee (*head of department*)
Dr BC Anderson
Prof MI Cherry
Prof SL Chown
Dr S Clusella-Trullas
Prof SR Daniels
Prof LL Dreyer
Dr AG Ellis
Dr AF Flemming
Dr S Jackson
Prof B Jansen van Vuuren
Dr JJ Le Roux
Dr NP Makunga
Prof PLN Mouton
Dr CA Pauw
Dr RV Rambau
Prof SA Reinecke
Prof DM Richardson
Dr TB Robinson
Prof TJ Robinson
Dr CA Simon
Prof VR Smith
Dr AJ Valentine
Prof JH van Wyk
Dr S von der Heyden
Prof TC Wossler

Centre of Excellence for Invasion Biology

Prof SL Chown (*director till May 2012*)
Prof DM Richardson (*director*)
Dr C Hui

Extraordinary professors

Prof S Barrett
Prof AM Bauer
Prof SL Chown
Prof MA McGeogh
Prof KJ Gaston
Prof MA McGeogh
Prof L Mumba

Support staff

L Willems (*principal secretary*)
JL Basson
A Fransman
F Gordon
RM Honing
S Johnson
DJD Julies
A Kleinert
R Robertson
MP Sauerman
M Siebritz
JN Smith



John Cooper was congratulated by Mark Anderson, CEO of BirdLife SA, and Vernon Head, chair of BirdLife South Africa.

Photo: Lesley Clemens

BirdLife SA honours seabird expert John Cooper

Seasoned ornithologist **John Cooper**, a research associate at Stellenbosch University, has become the first local seabird expert ever to receive the prestigious Gill Memorial Medal of BirdLife South Africa.

It is the second award made to Mr Cooper in 2012, and one which recognises his dedication over the past four decades to research and conserve seabirds such as albatrosses and petrels. Mr Cooper is a research associate of the DST-NRF Centre of Excellence for Invasion Biology at SU.

It is only the 18th time that the engraved bronze medal has been awarded since 1960, and the first time ever that it honours an ornithologist who has concentrated on studying seabirds over his career. The Gill Memorial Medal, BirdLife South Africa's most prestigious award, acknowledges an outstanding lifetime contribution of an amateur or professional person to the knowledge of southern African birds.

The mission of BirdLife South Africa is to promote the enjoyment, conservation, study and understanding of wild birds and their habitats

Photo: Engela Duvenage



Dr Sophie von der Heyden

Marine biologist writes book on sea life for children

Did you know that a sea-star feeds by pushing its stomach out through its mouth and placing it directly over its prey? That octopuses are quite clever? Or that Columbus' crabs are sky blue?

Dr Sophie von der Heyden, a marine biologist in the Department of Botany and Zoology at Stellenbosch University, wrote a marine guide with these and other interesting facts for children between the ages of eight and fourteen. *Southern African Sea Life: A Guide for Young Explorers* is published by Struik Nature and has been available in bookstores since November 2012.

The guide provides an overview of Southern African ocean currents, the importance and conservation of oceans, and various marine habitats. Marine plants and animals, such as seaweeds, molluscs, fish, seashore birds and marine mammals and reptiles are all discussed with the help of easy to understand text and quality colour photography.

Respected marine photographer **Guido Zsilavec** from the Southern Underwater Research Group (SURG) contributed most of the photographs that were used to make the identification of species easier. Illustrations by **Sally McLarty**, an experienced illustrator of children's and nature books, are also included.

The book includes a holiday guide section, which focuses on various popular sections of the Southern African coastline, including the West Coast, the Wild Coast, Namibia and Mozambique.

N Solomons
RC Thompson
JP Williams
H Witbooi

Centre of Excellence for Invasion Biology

K Coombe-Davis
S Davis
M de Morney
D du Plessis
M Gaertner
A Garthwaite
K Jumbam
T Khoza
S Kritzing-Klopper
E Marais
C Momberg
E Nortje
C Scheepers
D Scott
M van der Vyver

NRF-rated researchers

Leading international researcher

Prof Steven Chown
(biological invasions and evolutionary physiology)

Prof Dave Richardson
(biological invasions and conservation biogeography)

Prof Terry Robinson
(evolutionary genetics and phylogenomics of mammals)

Internationally acclaimed researcher

Prof Valdon Smith
(Antarctic and Southern Island biology and ecology)

Established researcher

Prof Mike Cherry
(behaviour ecology)

Prof Leanne Dreyer
(evolution of the Cape Flora)

Prof Conrad Matthee
(molecular systematics and phylogeography)

Prof Pieter le Fras Mouton
(evolutionary ecology of lizards)

Dr Alexander Valentine
(molecular physiology of host-microbe interactions of legumes in phosphorus deficient soils)

Prof Theresa Wossler
(communication and social organisation in hymenopteran)

Promising young researcher

Dr Bruce Anderson
(plant-animal interaction)

Prof Savel Daniels
(molecular systematics, phylogeography and conservation of invertebrata)

Dr Susana Clusella-Trullas
(thermal adaptation of ectotherms and implications for climate change)

Dr Allan Ellis
(evolutionary ecology of plants and insects)

Dr Nokwanda Makunga
(medicinal plant biotechnology)

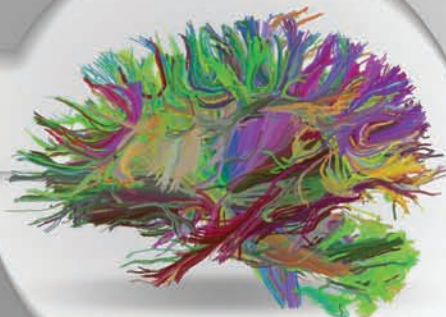
Dr Anton Pauw
(evolutionary ecology of plants and their pollinators)

Dr Victor Rambau
(cytogenetics, phylogeography)

Dr Carol Simon
(marine invertebrate reproduction and polychaete worm taxonomy)

Dr Sophie von der Heyden
(marine molecular ecology and conservation)

IMAGE 1



Department of
**Mathematical
 Sciences**
 (Mathematics, Applied Mathematics,
 Computer Sciences)

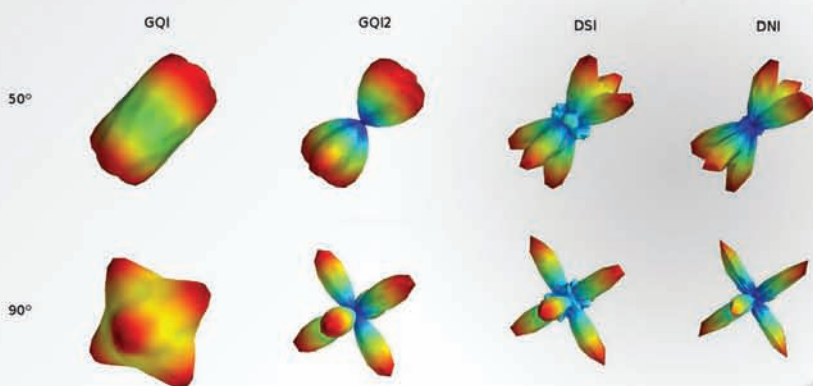
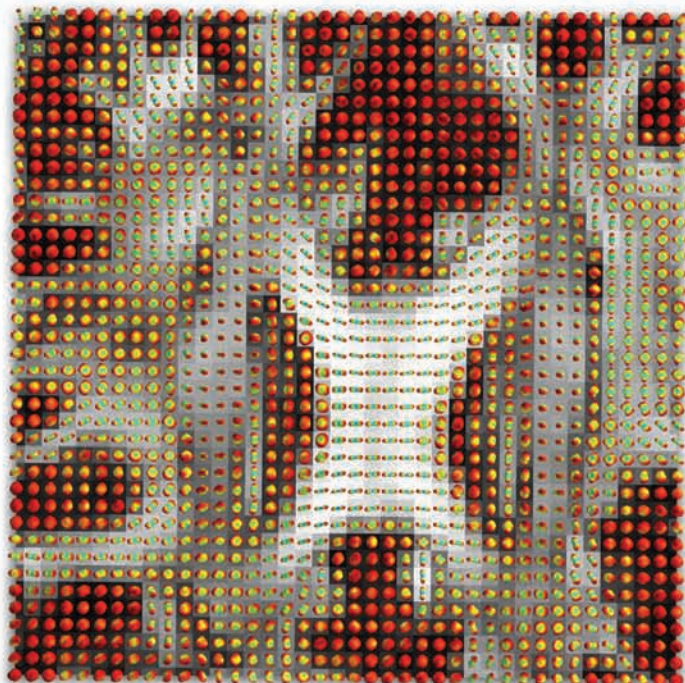


IMAGE 2

IMAGE 3



In an effort to understand the brain's structural connectivity, researchers in the field of Applied Mathematics are working towards improving techniques for modelling the diffusion of water molecules in the human brain. The images above show the probability of flow at single points in the brain (images 2, 3) while image 1 shows how the information can be integrated to represent fibre tracts.

Department of **Mathematical Sciences**

(Mathematics, Applied Mathematics, Computer Science)

Research Interests

Algebra and number theory; analysis, topology and category theory; approximation theory, computational mathematics, numerical analysis and scientific computing; discrete mathematics; financial mathematics; mathematical and computational biology; machine learning and computer vision; IP networks; automata theory and formal languages; program verification; flow modelling in porous media; software engineering.

Research outputs

Articles in accredited journals	52
Editorial activities (books and journals)	many
Books, conference proceedings, chapters in books	27
MSc students graduated in 2012	19
PhD students graduated in 2012	9

Research highlights

Researchers in Mathematics, Applied Mathematics and Computer Science have continued to achieve high standards in their respective fields of specialisation. This is reflected by the increased number of publications in journals of high standing and the strengthening of collaborations with other researchers and the industry.

The National Research Foundation (NRF) awarded six research chairs to Stellenbosch University under the South African Research Chair Initiative. One of these, a research chair in Mathematical and Theoretical Physical Biosciences, is a joint proposal of the Department of Mathematical Sciences and the African Institute for Mathematical Sciences (AIMS). This provides an exciting opportunity to build a special multidisciplinary research group.

The newly established IBM Software Centre of Excellence forms part of the IBM Academic Initiative, a global programme facilitating collaboration between IBM and educators. This centre will support the Computer Science Division in their training of highly skilled computer scientists to meet the shortage of such skilled professionals in industry and business. This centre includes a postgraduate computer laboratory and provides an environment for matching high-quality education with exposure to state-of-the-art and emerging technologies.

The Hungarian–South African Intergovernmental Science & Technology Cooperation Programme, coordinated by Prof Leon van Wyk, has stimulated collaboration between South African and Hungarian mathematicians working in the area of non-commutative ring theory. As part of this programme, Prof Van Wyk is collaborating with Prof Jenő Szegedi of the University of Miskolc, Prof dr. Hab Edmund Puczylowski of the University of Warsaw, and Dr Pham Ngoc Anh and Dr László Márki of the Renyi Institute of Mathematics at the Hungarian Academy of Sciences. During 2012 all these researchers visited Stellenbosch University and Prof Van Wyk also visited each of them during his sabbatical in the second semester. This research collaboration of the past three years has led to the publication of six research articles and the acceptance of another three articles. One of these articles was published in the *Journal of Algebra*, a leading international journal on general Algebra and the rest were published in *Linear Algebra and its Applications* and *Linear and Multilinear Algebra*, both being leaders in their field of Linear Algebra.

It is commendable that 52 research articles were published in accredited journals, with 44 of these written by researchers in Mathematics. Prof Florian Breuer's paper "Special subvarieties of Drinfeld modular varieties" was published in the *Journal Für Die Reine und Angewandte Mathematik*. This journal is ranked as being in the top

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Mathematics <http://math.sun.ac.za>

10% of Mathematics journals, based on article impact score, using the Science Citation Index. Prof Helmut Prodinger, the only A-rated researcher in the department, maintained his high annual publication rate of over ten publications, five of which were single-author papers. Prof Stephan Wagner published five papers, three of which were single-authored papers and Dr Zurab Janelidze published five papers, one of which was a single-authored paper. There is also a growing trend that supervisors are encouraging their graduate students to publish their results – five single-author papers were published by doctoral students in Mathematics.

We were very well presented at two national discipline conferences. The Computer Science Division presented seven papers at the 2012 Annual Congress of the South African Institute for Computer Scientists and Information Technologists (SAICSIT2012). This was a great achievement and an opportunity to showcase this division of our department. At the 55th Annual Congress of the South African Mathematical Society, the Mathematics Division presented 24 papers – ten by academic staff members and 14 by postgraduate students!

Our staff members were also actively involved as keynote speakers in both national and international workshops and conferences.

“Relaxation systems and high-order accurate flow computations” was the title of Prof Mapundi Banda’s invited lecture at the German Academic Exchange Service (DAAD) International Workshop on Modeling, Computing and Optimization (India). Prof Banda then delivered a plenary lecture entitled “Networking flow and transport processes” at the 55th Annual Congress of the South African Mathematical Society.

Prof André Weideman presented a plenary talk at the 36th South African Symposium on Numerical and Applied Mathematics (SANUM 2012): “Efficient Contour Integrals for the Numerical Inversion of the Laplace Transform”,

held at the University of the Witwatersrand. He also presented this as a colloquium talk at the University of Fribourg (Switzerland).

At a specialist Number Theory conference in Germany, Prof Florian Breuer gave an invited talk “On Drinfeld modular polynomials”.

Dr Bruce Bartlett gave an invited lecture entitled “Invariants of 3-manifolds via generators and relations of the 1-2-3 bordism 2-category” at the UCT/AIMS workshop on Geometric Analysis. During an invited research visit to Dr David Gay at the University of Georgia, Dr Bartlett presented the talk “Generators and relations for 1-2-3 topological quantum field theories” at the Georgia Topology Seminar.

Prof Willem Visser presented two invited lectures in the USA: “Green: Reduce, Reuse and Recycle Constraints” was presented at the NASA Ames Research Center and the title of the lecture he presented at the Fujitsu Laboratories of America, was “Probabilistic Symbolic Execution”. He presented the same paper as an invited talk at the Korea Advanced Institute of Science and Technology (KAIST) in South Korea.

Prof Willem Visser was elected to the executive committee of ACM SIGSOFT, the leading academic organisation for software engineering. His election is proof of his standing as an internationally recognised leading researcher in Software Engineering. Over the past four years he has maintained his collaboration with the NASA Ames Research Group on two projects: Java PathFinder and Symbolic PathFinder. He also presented papers at the International Symposium on Software Testing and Analysis (ISSTA) and the 20th International Symposium on the Foundations of Software Engineering (FSE 20) (USA). Prof Visser’s paper, based on his research visit to NASA in 2012, has been accepted for the 35th International Conference on Software Engineering (ICSE 2013).

Several researchers were granted sabbaticals. Prof Mapundi Banda was

granted research leave for six months as part of the conditions of his NRF Career Award for Y-rated researchers (2011 – 2012). During this time he spent a month at the University of British Columbia as a visiting professor, where he collaborated with Prof Douw Steyn.

Dr McElory Hoffmann visited the Department of Computer Science at the Université catholique de Louvain (Belgium) for ten months where he conducted research as a postdoctoral fellow and supervised Master’s students in the Machine Learning Group.

During her sabbatical for part of the second semester, Dr Karin Howell initiated a new research collaboration with an academic from Russia, Dr Dennis Chistyakov, as part of her “Maximal Algebras in Function Algebra” research project.

During his research leave in the first semester, Prof Helmut Prodinger headed to Shanghai and Taipei, to meet his scientific partners Dr Rosena Du, Dr Michael Fuchs and Dr Hsien-Kuei Hwang. Later in the year Dr Fuchs visited Prof Prodinger in Stellenbosch. On invitation from Dr Hwang, Prof Prodinger was bestowed the honour of writing an introductory chapter for the collected papers of Prof Philippe Flajolet. Part of his research leave was devoted to this special task, and the collection should appear in 2013.

Dr Stéfan van der Walt took up a postdoctoral research position in the Henry H Wheeler Jr Brain Imaging Center within the Helen Wills Neuroscience Institute, University of California at Berkeley. His research focused on the analysis of the fiber structure of the human brain, based on diffusion-weighted magnetic resonance imaging (MRI) data. In support of the project, and as part of a growing global movement towards open and reproducible research, contributions were made to several open source software packages, including DiPy (diffusion imaging in Python) and the IPython web notebook, a new platform for online publication and sharing of scientific computation and writing.

Photo: Engela Duvenage



Computer Science student Heila van der Merwe with Prof Willem Visser, head of the Division of Computer Science in the Department of Mathematical Sciences (Mathematics, Applied Mathematics, Computer Science) and Mr Clayton Booysen of the IBM Software Group.

SU home to IBM's first Software Centre of Excellence in South Africa

Stellenbosch University and IBM are collaborating to help meet the shortage of Computer Science skills in South Africa with the establishment of the Software Centre of Excellence on 12 June 2012.

The joint academic initiative will provide equipment and training resources to postgraduate Computer Science students, helping them develop much needed technical skills.

The first-of-its-kind centre of excellence in South Africa includes a postgraduate computer laboratory in the SU Computer Science Division, with advanced software including the Rational® development environment which will provide a fully-fledged software production environment for students to hone their skills.

The IBM Academic Initiative is a global programme that facilitates the collaboration between IBM and educators to teach students the information technology skills they need to be competitive and keep pace with changes in the workplace.

"It is important for us to enliven the classroom and that calls for integrating the latest technology into our curriculum in order to prepare students for high-value job opportunities," says Prof Ingrid Rewitzky, Vice-Dean: Teaching of the SU Faculty of Science and chair of the SU Department of Mathematical Sciences (Mathematics, Applied Mathematics, Computer Science).

The CoE opening is part of a long term relationship between the University and IBM.

Prof Leon van Wyk devoted his sabbatical to his collaborative projects with researchers in Hungary, as part of the Hungarian–South African Intergovernmental Science & Technology Cooperation Programme. He also visited Prof Kirby Smith at Texas A&M University for research collaboration.

During his six month sabbatical, Prof André Weideman visited Prof Bengt Fornberg at the University of Colorado Boulder (USA) for collaboration on a research article, "A computation exploration of the Second Painleve Equation" and Prof Nick Treffethan at the Mathematics Institute at the University of Oxford for further work on their survey article on the use of the trapezium rule in numerical mathematics. He also participated in conferences in Italy, the United Kingdom and Switzerland.

Two researchers of the Bureau of Industrial Mathematics at the University of Stellenbosch (BIMUS), Dr Milton Maritz, the director, and Prof Francois Smit, are currently involved in research and development projects in the field of Applied Mathematics in the private sector: Dr Maritz is working with Rheinmetall Denel Munition (Pty) Ltd on the following projects: Adaptation to STREAK: Software for analysing streak images in detonation events; Adaptation to JETP: Software for analysing (on X-ray film) particulation in shape charge jets; FRAPP: (New) Software for simulating trajectories of fragments and the subsequent penetration of plates; and 3-Dimensional reconstruction of trajectories of fragments from two or only one flash X-ray, with or without a horizontal witness plate (a geometrical and matching problem).

Prof Francois Smit is involved in consultative capacity for various projects with Rheinmetall Denel Munition (RDM), Denel Dynamics, Reutech Radar Systems (RRS), the Council for Scientific and Industrial Research (CSIR) and Formo Fibreglass. His current focus is the inter-institutional project "FLUXION: Research in the Computational Mechanics of Fluids" for the South

African Department of Defence. FLUXION is intended to develop skills in the field of computational mechanics and applications including computational fluid dynamics, finite element analysis and fluid structure interaction. This portion of the LEDGER programme is managed by the Aeronautics Systems competency area at the CSIR. The LEDGER programme is funded by the South African Department of Defence. Three postgraduate projects – a PhD (in Engineering) and two MSc projects in Applied Mathematics are included in this funding. Prof Francois Smit is the supervisor for both MSc students.

As part of the Memorandum of Understanding between Stellenbosch University and the CSIR, four researchers in Applied Mathematics are involved with collaborative projects with research units at the CSIR and with supervision of master's and doctoral students, enrolled at Stellenbosch University and based at the CSIR.

Prof Francois Smit and Dr Hardus Diedericks are supervisor and co-supervisor, respectively, of doctoral student, Mr Luther Terblanche, who is working on "Analysis of extreme events in the coastal zone" with the Coastal Engineering and Port Infrastructure group within the Built Environment Unit at the CSIR. In the same capacities they also supervise Mr Patrick Shabangu, a master's student working on "Investigating boundary conditions for near-shore area hydrodynamic models" with the Coastal Systems Group within the Natural Resources and the Environment Unit at the CSIR. They are also working on the improvement of boundary conditions for near-shore models in CFD applications.

Dr Willie Brink is collaborating with the Mobile Intelligent Autonomous Systems (MIAS) group within the Modelling and Digital Science unit at the CSIR.

Prof Mapundi Banda is supervising doctoral student Ms Belinda Matebese working on "Sampling-based algorithms for motion planning". She is based in Mobile Intelligent Autonomous Systems (MIAS) within the Modelling and Digital Science Unit at the CSIR. Prof Banda is also supervising doctoral student Mr

Tumelo Uoane working on “Modelling generation and transport of Acid Mine Drainage (AMD) using computational fluid dynamics (CFD) techniques” with the Advanced Mathematical Modelling and simulation Group within the Modelling and Digital Science Unit at the CSIR.

Academic affairs

We introduced new information and communication technologies to improve on the more traditional approaches to undergraduate teaching and learning in the department.

Addressing the need of first-year Computer Science students to have lectures in the language of their choice, Dr McElory Hoffmann made use of video recordings. For a week he presented the lectures in Afrikaans with English videos on the web and then the process was alternated in the subsequent week. Student feedback was extremely positive.

Dr Milton Maritz made use of self-developed demos in MATLAB in his Vector Calculus module he presented for second-year Engineering students, because the visualisation of concepts in vector calculus is fundamental for their understanding. The appreciation of the students made the effort worthwhile.

Dr Bruce Bartlett addressed the challenge of large tutorial classes (classes bigger than the desired one tutor for 20 students) in a creative way. He has been using the Multivariable Calculus course from MIT Open Courseware in his W244 class since 2011. The most useful aspect about this course is the recitation videos, where a student instructor demonstrates or “recites” the solutions to certain problems to a small group on the blackboard. Students love to see a solution “demonstrated” to them and at their own pace (not possible in large tutorial classes). Students draw inspiration and energy from the notion that they are potentially “on par” with MIT students.

Hands-on computer labs for the third-year Numerical Analysis module were developed by Prof André Weideman for students to effectively implement the methods developed in the lectures, meaningfully interpret the results, improve the algorithm and/or implementation as needed, and to make informed decisions about the most suitable algorithm for a particular problem.

With the ever decreasing availability of chalk boards and the requests from students for on-line notes, the tablets are proving popular for presenting lectures. Students benefit from this as lectures can be made available on the web immediately after the face-to-face class and the lectures are enhanced by the use of colour, pictures, demos and/or extracts from the textbook or other resources.

Mathematics students from nine South African universities attended the first Summer School in Number Theory organised by Prof Florian Breuer. The event aimed to attract talented undergraduate students in order to expose them to an exciting area of Mathematics not offered at all universities in South Africa and also to encourage them to pursue postgraduate studies in Mathematics. A focus was placed on elementary number theory, as well as analytic and combinatorial number theory. Advanced topics such as cryptography, Diophantine equations, cardinal arithmetic, elliptic curves, the Riemann Zeta-function and Riemann Hypothesis, Ducci sequences, and the analogy between number fields and function fields were also covered.

The Financial Mathematics Honours programme was launched as a joint initiative of Stellenbosch University, the University of Cape Town and the African Institute for Mathematical Sciences (AIMS). Dr Peter Ouweland is the local coordinator of the programme and is involved with lecturing three of the modules offered as part of the programme, as well as with project supervision.

A total of 28 students (15 South African students and 13 students from Africa) in the department were awarded PhD and Master’s degrees. These included two PhDs in Applied Mathematics, one PhD in Computer Science, six PhDs in Mathematics, two MSc degrees (cum laude) in Applied Mathematics, two MSc degrees (cum laude) in Computer Science, ten MSc degrees (cum laude) in Mathematics, one MSc degree in Computer Science and four MSc degrees in Mathematics. Among those graduating with a PhD in Applied Mathematics, was Ms Sonia Woudberg, a lecturer in Applied Mathematics.

About 20 honours students graduate each year. Most of these students choose to take up attractive employment offers in South Africa at financial institutions, IT companies and research and development institutes, such as the CSIR. A challenge for all three divisions is to attract more South African students to pursue master’s and doctoral

Doing maths for planet Earth

Well-known American mathematical physicist and blogger **Prof John Baez** delivered a public lecture at the 55th annual conference of the South African Mathematical Association via Skype, thereby saving one tonne of carbon emissions by not flying.

This was the first time that the conference, hosted by Stellenbosch University’s Department of Mathematical Sciences (Mathematics, Applied Mathematics, Computer Science), included a public lecture. The aim of the lecture was to raise awareness of 2013 being the year of Mathematics of Planet Earth, a global effort by mathematical societies and institutes to encourage scientists to study the math that underpins geologic and biological processes on Earth.

Prof Baez is also closely involved with the blog *Azimuth*, described as an international collaboration to create a focal point for scientists and engineers to work together on common problems such as climate change, mass extinction and peak oil.

According to Prof Baez the global warming crisis is part of a bigger transformation in which humanity has to realise that Earth is a finite system: “Our population, energy usage and the like cannot continue to grow exponentially. If civilization survives this transformation, it will affect mathematics – and be affected by it – just as dramatically as the agricultural revolution or industrial revolution,” he writes on his blog about the lecture.

The rest of the conference focused on the role these annual events play in enhancing collaborative mathematics research endeavours between South African and African universities.

First summer school in number theory held

Mathematics students from nine South African universities attended the first Summer School in Number Theory from 23 to 27 January 2012 at SU.

The summer school was presented by the Mathematics division of the SU Department of Mathematical Sciences (Mathematics, Applied Mathematics, Computer Science) under leadership of **Prof Florian Breuer** and **Lesley Wessels**.

According to Prof Breuer, the event aimed to attract especially talented undergraduate students in order to expose them to this exciting area of Mathematics and motivate them to continue with graduate studies in Mathematics.

A focus was placed on elementary number theory, as well as analytic and combinatorial number theory. Advanced topics such as cryptography, diophantine equations, cardinal arithmetic, elliptic curves, the Riemann Zeta-function and Riemann Hypothesis, Ducci sequences, and the analogy between number fields and function fields were also covered.

Lectures were presented by PhD student **Dirk Basson** and SU mathematicians **Prof Stephan Wagner**, **Dr Arnold Keet**, **Prof Florian Breuer**, **Dr Zurab Janelidze** and **Ms Lesley Wessels**, as well as **Dr Christine Swart** and **Dr Kenneth Hughes** from the University of Cape Town.

studies, even for part-time study while working in industry.

Service to the scientific community

The 55th Annual Congress of the SA Mathematical Society with the theme "Maths uniting Africa" was hosted by the department from 31 October to 2 November. The theme was chosen to emphasise the important role these annual congresses play in enhancing collaborative mathematics research endeavours between universities in South Africa and Africa. The organising committee – Dr Bruce Bartlett, Prof Florian Breuer, Dr Cornelia Naude, Dr Paul Grobler, Dr Karin-Therese Howell, Prof Stephan Wagner and chaired by Prof Ingrid Rewitzky – incorporated several fresh ideas into the normal congress programme. These included a public lecture on the eve of the congress, a new and fairer system for evaluating postgraduate presentations for the best talk awards, a more organised programme for the contributed talks, congress material respecting the Go Green Campaign of the university, personalised wine gifts, and a conference photo.

It is an honour for academics to be involved in discipline-focussed organisations, associations or research groups and several academic staff members are involved in research journal editorial activities and/or programme committees of research conferences in Computer Science.

Dr Sonia Woudberg will serve as the treasurer of the Southern African Society of Rheology (SASOR) from 2012 to 2014.

Dr Bruce Bartlett is a research associate of the National Institute for Theoretical Physics (NITHEP) and he served on the advisory committee for the Berlin 10 Open Access conference held at STIAS in November 2012.

Dr Farai Nyabadza serves as a board member of the Canon Collins Trust in Southern Africa, as the secretary general of the Africa Society for Biomathematics (ASB), and as the secretary general of the Southern Africa Mathematical Sciences Association (SAMSA).

Dr Zurab Janelidze was appointed as a consultant for a Portuguese grant project "Métodos Categoriais em Álgebra Não Abeliana" funded by Fundação para a Ciência e a Tecnologia (FCT, Portugal).

In recognition of their significant contributions to the African Institute for

Mathematical Science (AIMS), Prof Stephan Wagner has been appointed as an AIMS associate faculty member; Prof Florian Breuer as an AIMS associate research fellow, and Prof Ingrid Rewitzky as a member of the AIMS executive team.

Awards to staff and students

Dr Hendrik Boshoff, Mr Piet Crous, Prof Florian Breuer, Prof David Holgate, Dr Zurab Janelidze and Dr Farai Nyabadza were honoured at the First-Year Academy's Prestige Evening, in recognition of their contribution to the success of the University's top 32 first-year students.

Lecturers as well as postgraduate students made us proud with their award-winning papers presented at conferences.

Mr Jacques Swanepoel, a junior lecturer in Computer Skills and a doctoral student in Applied Mathematics, received the International Graphonomics Society Best Student Paper Award at the 13th International Conference on Frontiers in Handwriting Recognition. The title of his winning talk was "Writer-specific dissimilarity normalisation for improved writer-independent off-line signature verification".

Mr Willem Bester, Dr Cornelia Inggs and Prof Willem Visser won the award for the best Computer Science paper, entitled "Test-case generation and bug-finding through symbolic executions", at the 2012 Annual Congress of the South African Institute for Computer Scientists and Information Technologists (SAICSIT 2012). This paper is based on Mr Willem Bester's research work for his Master's thesis.

At the annual congress of the South African Mathematics Society, Mr Dirk Basson received the award for the best doctoral research talk, while Mr Tovo Randrianarisoa and Mr Anton de Villiers were awarded honorable mention for their master's research talks.

Ms Maryke van der Walt received the Faculty of Science Medal for 2012 for being the best master's student in the Faculty. Her master's thesis entitled "Ternary Interpolation Subdivision" was prepared under the supervision of Prof Johan de Villiers. She is now pursuing her doctoral studies at the University of Missouri - St Louis under the supervision of Professor Qingtang Jiang.

Mnr Jan Buys, whose honours project was supervised by Prof Brink van der Merwe in 2011, received the IBM prize in 2012 for the

best honours student in Computer Science.

DAAD (the German Academic Exchange Service) in association with the African Institute for Mathematical Sciences (AIMS), awards annually seven, three-year scholarships for exceptional students (who are African nationals from Sub-Saharan countries, excluding South African nationals) to pursue a PhD programme in Mathematical Sciences at a South African university. In 2012, Mr Eric Andriantiana, Mr Eyaya Eneyew, Mr Tahina Rakotoniaina, Ms Ony Minoarivelo received such scholarships for their doctoral studies in the department. In December 2012, an additional three Stellenbosch University students – Mr Alex Bamunoba, Ms Savannah Nuwagaba, and Mr Fortunat Solofomampionoa Rajaona - were awarded such scholarships.

Staff matters

During the year the Ad Hominem promotion of several staff members were approved with effect from 1 January 2013. Prof Florian Breuer, Dr Farai Nyabadza and Dr Karin-Therese Howell were promoted to full professor, associate professor and senior lecturer respectively (Mathematics). Dr Stéfan van der Walt and Dr Sonia Woudberg were promoted to senior lecturer (Applied Mathematics).

In January 2012 we welcomed Prof Mapundi Banda as a professor of Applied Mathematics. His research interests lie in numerical methods for flow and transport processes. After leaving academia for five years to pursue research as a numerical modeller in the National Resources and the Environment Unit at the CSIR, Dr Gerhardus Diedericks was attracted back to Stellenbosch University as a senior lecturer in Applied Mathematics.

Prof David Holgate resigned in September after 15 years of service to the university to take up the position of professor and Chair of the Department of Mathematics and Applied Mathematics at the University of the Western Cape.

In November, Applied Mathematics hosted a special retirement lunch for Mr Piet Crous who retired after 43 years of service to Stellenbosch University. He was the epitome of professionalism who always focused on the bigger picture. His enormous contributions over the years cannot be measured by numbers or awards – he significantly and positively influenced generations of students with his special ability to connect with his students.

Three vacancies in the department were filled with appointments of upcoming young academics. In Computer Science, Prof Bernd Fischer will take up the position of associate professor in February 2013 and will strengthen the System Software Verification research group. In Mathematics, Dr Gareth Boxall and Dr Dimbinaina Ralaivaosaona will take up lectureships in April 2013 and July 2013, respectively. Dr Boxall's research expertise lies in Model Theory and Logic, and Dr Ralaivaosaona's in Probabilistic Combinatorics.

Community interaction

The International Mathematical Union declared "The Mathematics of Planet Earth" as the theme for 2013, and with the involvement of the South African Mathematical Society (SAMS) and the African Institute for Mathematical Sciences (AIMS) in activities celebrating this theme, it was decided that a public lecture be organised to precede the 55th Annual Congress of the South African Mathematical Society at Stellenbosch University. This event, organised by Dr Bruce Bartlett, was quite unique since it featured Prof Mark Swilling (Director of the Sustainability Institute) as well as Prof John Baez (University of California Riverside), who presented via Skype and pre-recorded video. The event was attended by about 190 people, including a number of learners from the Cape Academy of Mathematics Science and Technology in Cape Town, SAMS delegates, students and staff members of Stellenbosch University, members of the public, and AIMS students. The event was extensively advertised to schools in the Stellenbosch district. Prof John Baez's talk is available on YouTube (<http://www.youtube.com/watch?v=L4RpU1lLg34>) and has been discussed in online forums.

The Maties Computing Club, currently co-ordinated by Mr Willem Bester and Dr Steve Kroon, was launched by the Computer Science Division. At the weekly Friday meetings, there is an interactive informal lecture to encourage learners and people from industry, regardless of their level of technical background, to do some programming.

As part of her role as Community Interaction and Marketing representative, Dr Karin-Therese Howell initiated school visits to talk to learners about studying Mathematics and career possibilities. A programme for tracking the progress of

students majoring in Mathematics over their three-year degree programme was initiated in order to ensure the Mathematics modules are inspiring and relevant, and will continue next year.

Prof Lynette van Zijl is passionate about support for students with unique challenges in the learning environment – in particular, students who have visual barriers, limited hearing, are on the autism spectrum, or have reading and/or learning challenges (dyslexia, dysgraphia). Through her development of computer-assisted therapies, learners and university students with such disorders have a better chance of success in their studies. It is noteworthy that these technology systems are applications of her research work in automata theory, and that she is being approached for assistive technology consultation by schools.

The Department of Mathematical Sciences, under the coordination of Prof Pieter Maritz, is one of the training centres of the Siyanqoba Regional Olympiad Training Programme (sponsored by the Department of Science and Technology and run by the South African Mathematics Foundation.) The aim is to assist high school learners, in particular non-white learners, entering in Olympiad competitions to improve their performance and competence. Prof Stephan Wagner and Dr Steve Kroon have been involved in the training sessions. In addition, under the leadership of Prof Stephan Wagner, the department has continued its active involvement in the South African Mathematics Olympiad Training Programme (sponsored by Harmony Gold Mining) with a training camp each December as well as on South African Mathematics Olympiad Committees responsible for setting and moderating the annual South African Mathematics Olympiad question papers.

Collaboration

SOUTH AFRICA

African Institute for Mathematical Sciences (AIMS)
Council for Scientific and Industrial Research
Denel
Gensec Asset Management
iThemba Labs
Nelson Mandela Metropolitan University
Reutech Radar Systems
Rheinmetall Denel Munition
SASOL
University of Pretoria
University of the Witwatersrand

AFRICA

National University of Science and Technology (Zimbabwe)
Université d'Antananarivo (Madagascar)
University of Botswana (Botswana)



MSc student Mr Willem Bester

Computer Science student wins best paper award

Students from Stellenbosch University's Computer Science Division in the Department of Mathematical Sciences presented a record number of papers at the 2012 Annual Research Conference of the South African Institute for Computer Scientists and Information Technologists (SAICSIT 2012), that ran from 1 to 3 October 2012 in Centurion, Gauteng.

Furthermore, **Mr Willem Bester** won the Best Computer Science paper award for his contribution titled 'Bug-finding and automatic test-case generation through symbolic execution'. The paper is based on his MSc study under the guidance of **Prof Willem Visser** and **Dr Cornelia Inggs**.

INTERNATIONAL

Argentina
Instituto Tecnológico de Buenos Aires (ITBA)

Australia
University of Melbourne

Austria
Alpen Adria Universität Klagenfurt
Graz University of Technology
Vienna University of Technology

Belgium
Université catholique de Louvain

Germany
University of Kassel
University of Tübingen

Hungary
Hungarian Academy of Sciences
University of Miskolc

Ireland
Trinity College Dublin

Mexico
Universidad Nacional Autónoma de México

Poland
National Institute of Telecommunications
University of Warsaw

Portugal
Centre for Mathematics University of Coimbra

Romania
University of Bucharest

Russia
Joint Institute for Nuclear Research
Moscow State Pedagogical University

Serbia
University of Kragujevac
University of Novi Sad

Switzerland
ETH Zürich

United States of America
Georgia Southern University
NASA Ames Research Centre
Texas A&M International University
University of Colorado Boulder
University of Nebraska-Lincoln

Funding

Armcor
Bureau for Industrial Mathematics at Stellenbosch University (BIMUS)
Mellon Early Researcher Career Programme (Mentorship Programme)
Nokia Siemens Networks
National Research Foundation Bilateral Cooperation: Hungary
National Research Foundation Incentive Funding
Stellenbosch University
Telkom

Staff

Academic

Prof IM Rewitzky (*executive head*)
Prof MK Banda
Dr B Bartlett
Prof F Breuer
Dr WH Brink
EJ Burger
Dr J Coetzer
PH Crous
Dr GH Diedericks
Prof A Fransman
Dr J Geldenhuys
I Govender
Prof BW Green
Dr PJP Grobler
Prof J Hargrove
HA Haroldt
Prof BM Herbst
Dr M Hoffman
Prof D Holgate
Dr K-T Howell
Dr CP Inggs
Dr Z Janelidze
Dr AP Keet
Dr RS Kroon
Dr MF Maritz
Prof S Mouton
Dr MA Muller
Dr NL Muller
Dr CG Naude
Dr F Nyabadza
Dr P Ouwehand
Prof H Prodingier
Prof GJF Smit
JP Swanepoel
Prof AB van der Merwe
Dr S van der Walt
Prof L van Wyk
Prof L van Zijl
Prof W Visser
Prof S Wagner
Prof JAC Weideman
LK Wessels
Prof M Wild
SWoudberg

Extraordinary professors

Prof JM de Villiers
Prof MB Dwyer
Prof T Krzesinski
Prof JW Sanders
Prof B Schölkopf

Extraordinary associate professors

Prof K Scheffler

Extraordinary senior lecturers

Dr R Ghomrasni

Dr A Welte

Extraordinary lecturer

Dr R Ouifki

Extraordinary researcher

Prof D Laurie

Prof P Maritz

Dr C Rohwer

Support staff

M Abrahams

A Adams

L Adams

W Bester

W Isaacs

B Jacobs

OM Marais

MM Rhoda

AL Roman

D Stephanus

M van Niekerk

NRF-rated researchers**Leading international researcher**

Prof Helmut Prodinger

*(analysis of algorithms, number theory and combinatorics)***internationally acclaimed researcher**

Prof Ben Herbst

(computer vision and machine learning)

Prof David Holgate

(category theory)

Prof Leon van Wyk

(ring theory and matrix algebras)

Prof Willem Visser

(software failure, software engineering and software development)

Prof André Weideman

*(numerical analysis and scientific computation)***Established researcher**

Prof MK Banda

(numerical methods for flow and transport processes)

Dr Jaco Geldenhuys

(software engineering, specifically model checking and process algebra)

Dr Sonja Mouton

(banach algebras and spectral theory)

Dr F Nyabadza

(mathematical biology)

Prof Ingrid Rewitzky

(mathematics of computer science)

Prof Brink van der Merwe

(automata theory)

Prof Lynette van Zijl

*(theoretical computer science and assistive technologies)***Promising young researcher**

Prof Florian Breuer

(number theory)

Dr Zurab Janelidze

(category theory and universal algebra)

Prof Stephan Wagner

(combinatorics and graph theory)

Jacques Swanepoel (right) at the award ceremony with awardee George Eskander, Angelo Marcelli of the International Graphonomics Society (IGS), conference chair Sebastiano Impedovo, and Rejean Plamondon (IGV).

Signature expert wins award in Italy

Jacques Swanepoel, a doctoral student in Applied Mathematics, received international recognition for the development of specific algorithms that can be used to make it easier to identify static signatures.

He received a prize from the International Graphonomics Society for the best presentation by a student during the International Conference on Frontiers in Handwriting Recognition in Italy. Graphonomics entails the analysis, recognition and production of handwriting.

The title of his winning talk was "Writer-specific Dissimilarity Normalisation for Improved Writer-independent Off-line Signature Verification". The term 'off-line' in handwriting analysis refers to traditional pen-on-paper signatures, which are digitalised with a scanner, whereas 'on-line' signatures are made on a tablet with a digital pen.

His research was not conferred an award for nothing. Mr Swanepoel has already tested it on Dolfing's data set, a database of 1 530 authentic signatures and 3 000 forged versions and found that his system was, time and again, more successful in indicating the real signature than any other existing system.

This would be extremely valuable in, among others, banking, where it is necessary first to determine whether or not a signature on a cheque or credit-card slip is authentic before payment is made.

Mr Swanepoel is doing his doctoral research under the supervision of **Dr Hanno Coetzer** of the Applied Mathematics Division in the Department of Mathematical Sciences (Mathematics, Applied Mathematics and Computer Science). It forms part of research on computer vision, pattern recognition and machine learning.

Publikasielys | Publication list

Aardwetenskappe | Earth Sciences

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

ACOSTA-VIGIL A, BUICK I, CESARE B, LONDON D, MORGAN GB. The extent of equilibration between melt and residuum during regional anatexis and its implications for differentiation of the continental crust: A study of partially melted metapelitic enclaves. *Journal of Petrology* 2012; **0(0)**: 1-38.

CLEMENS JD, BIRCH WD. Assembly of a zoned volcanic magma chamber from multiple magma batches: The Cerberean Cauldron, Marysville Igneous Complex, Australia. *Lithos* 2012; **155**: 272-288.

CLEMENS JD, FINGER F. Formation of high $\delta^{18}O$ fayalite-bearing A-type granite by high-temperature melting of granulitic metasedimentary rocks, southern China. *Geology*, doi:10.1130/G33175C. *Geology* 2012; **40(10)**: 277.

CLEMENS JD, STEVENS G. What Controls Chemical Variation in Granitic Magmas?. *Lithos* 2012; **134-135**: 317-329.

FARINA F, STEVENS G, DINI A, ROCCHI S. Peritectic phase entrainment and magma mixing in the late Miocene Elba Island laccolith-pluton-dyke complex (Italy). *Lithos* 2012; **153**: 243-260.

HALL DJ, KISTERS AFM. The stabilization of self-organised leucogranite networks - Implications for melt segregation and far-field melt transfer in the continental crust. *Earth and Planetary Science Letters* 2012; **355-356**: 1-12.

KISTERS AFM, VAN HINSBERG V, SZILAS K. Geology of an Archaean accretionary complex - The structural record of burial and return flow in the Tartoq Group of South West Greenland. *Precambrian Research* 2012; **220-221**: 107-122.

KISTERS AFM, VIETZE ME, BUICK I. Deformation and age of the Stinkbank Pluton and implications for the correlation of tectonometamorphic episodes in the Pan-African Damara Belt. *South African Journal of Geology* 2012; **115(3)**: 309-326.

KÖKSAL S, MÖLLER A, GÖNCÜOĞLU MC, FREI D, GERDES A. Crustal homogenization revealed by U-Pb zircon ages and Hf isotope evidence from the Late Cretaceous granitoids of the Agacoren intrusive suite (Central Anatolia/Turkey). *Contributions to Mineralogy and Petrology* 2012; **163**: 725-743.

LAURIE A, STEVENS G, VAN HUNEN J. The end of continental growth by TTG magmatism. *Terra Nova* 2012; **00**: 1-7.

LAURIE A, STEVENS G. Water-present eclogite melting to produce Earth's early felsic crust. *Chemical Geology* 2012; **314-317**: 83-95.

LE ROEX AP, CHEVALLIER L, VERWOERD WJ, BAREND S. Petrology and geochemistry of Marion and Prince Edward Islands, Southern Ocean: Magma chamber processes and source region characteristics. *Journal of Volcanology and Geothermal Research* 2012; **223-224**: 11-28.

PHILLIPS GN, POWELL R. Origin of Witwatersrand gold: a metamorphic devolatilisation - hydrothermal replacement model. *Applied Earth Science*, 2011; **120(3)**: 112-129.

ROWE CD, FAGERENG A, MILLER JA, MAPANI B. Signature of coseismic decarbonation in dolomitic fault rocks of the Naukluft Thrust, Namibia. *Earth and Planetary Science Letters* 2012; **333-334**: 200-210.

SWART S, CHANG N, FAUCHEREAU N, JOUBERT W, LUCAS M, MTSHALI T, ROYCHOUDHURY AN, TAGLIABUE A, THOMALLA S, WALDRON H, MONTEIRO PMS. Southern Ocean Seasonal Cycle Experiment 2012: Seasonal scale climate and carbon cycle links. *South African Journal of Science* 2012; **108(3/4)**: 1-3.

TAGLIABUE A, MTSHALI T, AUMONT O, BOWIE AR, KLUNDER MB, ROYCHOUDHURY AN, SWART S. A global compilation of dissolved iron measurements: focus on distribution and processes in the Southern Ocean. *Biogeosciences* 2012; **9**: 2333-2349.

TAYLOR J, STEVENS G, BUICK I, LANA C. Successive midcrustal, high-grade metamorphic events provide insight into Mid-Archean mountain-

building along the SE margin of the proto-Kaapvaal craton. *Geological Society of America Bulletin* 2012; **124**: 1191-1211.

VILLAROS A, BUICK I, STEVENS G. Isotopic variations in S-type granites: an inheritance from a heterogeneous source?. *Contributions to Mineralogy and Petrology* 2012; **163**: 243-257.

VON DER HEYDEN BP, ROYCHOUDHURY AN, MTSHALI TN, TYLISZCZAK T. Chemically and Geographically distinct solid-phase iron pools in the Southern Ocean. *Science* 2012; **338(6)**: 1199-1201.

Doktoraal Afgehandel/Doctoral completed

SANCHEZ-GARRIDO CJMG. The petrogenesis of the older (> 3.0 Ga) potassic granitoids of eastern Mpumalanga (South Africa) and Swaziland: an investigation of crustal formation processes in the early Earth. PhD, 2012. 222 pp. Promotor: Stevens G.

TAYLOR J. The anatexis history of Archaean metasedimentary granulites from the Ancient Gneiss Complex, Swaziland. PhD, 2012. 140 pp. Promotor: Stevens G.

VAN DER WESTHUIZEN A. Provenance of alluvial diamonds in Southern Africa: a morphological and mineral chemistry study of diamonds and related heavy minerals from the Vaalorange system and the West Coast. PhD, 2012. 371 pp. Promotor: Rozendaal A.

Biochemie | Biochemistry

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

ABRIE JA, GONZALEZ A, STRAUSS E, ARINO J. Functional mapping of the disparate activities of the yeast moonlighting protein Hal3. *Biochemical Journal* 2012; **442**: 357-368.

ALBRECHT CF, STANDER MA, GROBELAAR MC, COLLING J, KOSSMANN J, HILLS PN, MAKUNGA NP. LC-MS-based metabolomics assists with quality assessment and traceability of wild and cultivated plants of *Sutherlandia frutescens* (Fabaceae). *South African Journal of Botany* 2012; **82**: 33-45.

BAUER R, BASSON CE, BEKKER J, EDUARDO I, ROHWER JM, UYS L, VAN WYK JH, KOSSMANN J. Reuteran and levan as carbohydrate sinks in transgenic sugarcane. *Planta* 2012; **236**: 1803-1815.

BELLSTEDT DU, GALLEY C, PIRIE MD, LINDER HP. The Migration of the Palaeotropical Arid Flora: Zygophylloideae as an Example. *Systematic Botany* 2012; **37(4)**: 951-959.

CUEVAS JM, DELAUNAY A, VISSER JC, BELLSTEDT DU, JACQUOT E, ELENA SF. Phylogeography and Molecular Evolution of *Potato virus Y*. *PLoS ONE* 2012; **7(5)**: e37853.

DE BEER D, SCHULZE AE, JOUBERT E, DE VILLIERS AJ, MALHERBE CJ, STANDER MA. Food ingredient extracts of *Cyclopia subternata* (Honeybush): Variation in phenolic composition and antioxidant capacity. *Molecules* 2012; **17**: 14602-14624.

DU PLESSIS DM, BOTES M, DICKS LMT, CLOETE TE. Immobilization of commercial hydrolytic enzymes on poly (acrylonitrile) nanofibers for anti-biofilm activity. *Journal of Chemical Technology and Biotechnology* 2012; **88(4)**: 585-593. DOI 10.1002/jctb.3866.

DU PREEZ F, VAN NIEKERK DD, KOOI BW, ROHWER JM, SNOEP JL. From steady-state to synchronized yeast glycolytic oscillations I: model construction. *Febs Journal* 2012; **279**: 2810-2822.

DU PREEZ F, VAN NIEKERK DD, SNOEP JL. From steady-state to synchronized yeast glycolytic oscillations II: model validation. *Febs Journal* 2012; **279**: 2823-2836.

GEENEN S, DU PREEZ F, REED M, NIJHOUT HF, KENNA JG, WILSON ID, WESTERHOFF HW, SNOEP JL. A mathematical modelling approach to assessing the reliability of biomarkers of glutathione metabolism. *European Journal of Pharmaceutical Sciences* 2012; **46** : 233-243.

GELDERBLOM WCA, MARASAS WFO. Controversies in fumonisin mycotoxicology and risk assessment. *Human & Experimental Toxicology* 2012; **3** : 215-235.

GUSTAVSSON A-K, VAN NIEKERK DD, ADIELS CB, DU PREEZ F, GOKSÖR M, SNOEP JL. Sustained glycolytic oscillations in individual isolated yeast cells. *Febs Journal* 2012; **279** : 2837-2847.

KADEREIT G, ACKERLY D, PIRIE MD. A broader model for C_4 photosynthesis evolution in plants inferred from the goosefoot family (Chenopodiaceae s.s.). *Proceedings of the Royal Society B-Biological Sciences* 2012; **279** : 3304-3311.

KISSLING J. Taxonomy of *Exochaenium* and *Lagenias*: Two Resurrected Genera of Tribe Exaceae (Gentianaceae). *Systematic Botany* 2012; **37**(1) : 238-253.

KOLODKIN A, BOOGERD FC, PLANT N, BRUGGEMAN F, GONCHARUK V, LUNSHOF J, MORENO-SANCHEZ R, YILMAZ N, BAKKER BM, SNOEP JL, BALLING R, WESTERHOFF HW. Emergence of the silicon human and network targeting drugs. *European Journal of Pharmaceutical Sciences* 2012; **46** : 190-197.

LAMPRECHT DA, MUNERI NO, EASTWOOD H, NAIDOO K, STRAUSS E, JARDINE A. An enzyme-initiated Smiles rearrangement enables the development of an assay of MshB, the GlcNAc-Ins deacetylase of mycothil biosynthesis. *Organic & Biomolecular Chemistry* 2012; **10** : 5278.

LONG HS, STANDER MA, VAN WYK B-E. Notes on the occurrence and significance of triterpenoids (asiaticoside and related compounds) and caffeoylquinic acids in *Centella* species. *South African Journal of Botany* 2012; **82** : 53-59.

MARASAS WFO, GELDERBLOM WCA, SHEPHARD GS, VISMER HF. Mycotoxicological research in South Africa 1910-2011. *World Mycotoxin Journal* 2012; **5**(1) : 89-102.

NAIDOO VM, RAUTENBACH M. Bidirectional solid phase synthesis of a model oligoglycine bolaamphiphile and purification by rapid self-assembly. *Journal of Peptide Science* 2012; **18** : 317-325.

PIRIE MD, HUMPHREYS AM, ANTONELLI A, GALLEY C, LINDER HP. Model uncertainty in ancestral area reconstruction: A parsimonious solution?. *Taxon* 2012; **61**(3) : 652-664.

RAUTENBACH M, EYÉGHÉ-BIKONG HA, VLOK NM, STANDER MA, DE BEER A. Direct surfactin-gramicidin S antagonism supports detoxification in mixed producer cultures of *Bacillus subtilis* and *Aneurinibacillus migulanus*. *Microbiology* 2012; **158** : 3072-3082.

ROHWER JM. Kinetic modelling of plant metabolic pathways. *Journal of Experimental Botany* 2012; **63**(6) : 2275-2292.

SCHLOMS L, STORBECK K-H, SWART P, GELDERBLOM WCA, SWART AC. The influence of *Aspalathus linearis* (Rooibos) and dihydrochalcones on adrenal steroidogenesis: Quantification of steroid intermediates and end products in H295R cells. *Journal of Steroid Biochemistry and Molecular Biology* 2012; **128** : 128-138.

SHERIDAN CM, PETERSEN J, ROHWER JM. On modifying the Arrhenius equation to compensate for temperature changes for reactions within biological systems. *Water SA* 2012; **38**(1) : 149-151.

STORBECK K-H, SWART AC, LOMBARD N, ADRIAANSE C, SWART P. Cytochrome b_5 forms homomeric complexes in living cells. *Journal of Steroid Biochemistry and Molecular Biology* 2012; **132** : 311-321.

THOMPSON GD, BELLSTEDT DU, BYRNE M, MILLAR MA, RICHARDSON DM, WILSON JRU, LE ROUX J. Cultivation shapes genetic novelty in a globally important invader. *Molecular Ecology* 2012; **21** : 3187-3199.

TROSKIE AM, VLOK NM, RAUTENBACH M. A novel 96-well gel-based assay for determining antifungal activity against filamentous fungi. *Journal of Microbiological Methods* 2012; **91** : 551-558.

VAN DER MERWE JD, JOUBERT E, MANLEY M, DE BEER D, MALHERBE CJ, GELDERBLOM WCA. Mangiferin glucuronidation: Important hepatic modulation of antioxidant activity. *Food and Chemical Toxicology* 2012; **50** : 808-815.

VAN DER WESTHUYZEN R, HAMMONS JC, MEIER JL, DAHESH S, MOOLMAN WJA, PELLY SC, NIZET V, BURKART MD, STRAUSS E. The antibiotic CJ-15,801 is an antimetabolite that hijacks and then inhibits CoA biosynthesis. *Chemistry & Biology* 2012; **19** : 559-571.

VISSER JC, BELLSTEDT DU, PIRIE MD. The Recent Recombinant Evolution of a Major Crop Pathogen, *Potato virus Y*. *PLoS ONE* 2012; **7**(11) : e50631.

WALLACE BD, EDWARDS JS, WALLEN JR, MOOLMAN WJA,

VAN DER WESTHUYZEN R, STRAUSS E, REDINBO MR, CLAIBORNE A. Turnover-Dependent Covalent Inactivation of *Staphylococcus aureus* Coenzyme A-Disulfide Reductase by Coenzyme A-Mimetics: Mechanistic and Structural Insights. *Biochemistry* 2012; **51** : 7699-7711.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

EICHER JJ, SNOEP JL, ROHWER JM. Determining Enzyme Kinetics for Systems Biology with Nuclear Magnetic Resonance Spectroscopy. *Metabolites* 2012; **2** : 818-843.

MAGWEBEBA T, RIEDEL S, SWANEVELDER S, BOUIC P, SWART P, GELDERBLOM WCA. Interleukin-1 α Induction in Human Keratinocytes (HaCaT): An *In Vitro* Model for Chemoprevention in Skin. *Journal of Skin Cancer* 2012; **2012** : 1-10.

Doktoraal Afgehandel/Doctoral completed

ABRIE JA. Investigation of the structural and functional diversity of phospho-pantothenoylcysteine decarboxylases. PhD, 2012. 164 pp. Supervisor: Strauss E.

GOOSEN P. The influence of 3 β HSD on adrenal steroidogenesis and the factors which influence its activity. PhD, 2012. 135 pp. Supervisor: Swart P. Cosupervisor: Swart AC.

HOUGH D. Comparison of two CYP17 isoforms: implications for cortisol production in the South African Merino. PhD, 2012. 154 pp. Supervisor: Swart P. Cosupervisor: Cloete SWP.

MFA MEZUI A. The effect of ultraviolet-C treatment on the biochemical composition of beer. PhD, 2012. 186 pp. Supervisor: Swart P. Cosupervisor: Rautenbach M.

VISSER JC. A study of the strain evolution and recombination of South African isolates of Potato virus Y. PhD, 2012. 180 pp. Supervisor: Bellstedt DU.

Chemie en Polimeerwetenskap | Chemistry and Polymer Science

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

AHAMAD T, MAPOLIE SF, ALSHEHRI SM. Synthesis and characterization of polyamide metalloendrimers and their anti-bacterial and anti-tumor activities. *Medicinal Chemistry Research* 2012; **21** : 2023-2031.

ALBERTS P, STANDER MA, DE VILLIERS AJ. Advanced ultra high pressure liquid chromatography-tandem mass spectrometric methods for the screening of red wine anthocyanins and derived pigments. *Journal of Chromatography A* 2012; **1235** : 92-102.

ANDERSSON RL, SALAJKOVA M, MALLON PE, BERGLUND LA, HEDENQVIST MS, OLSSON RT. Micromechanical tensile testing of cellulose-reinforced electrospun fibers using a template transfer method (TTM). *Journal of Polymers and the Environment* 2012; **20** : 967-975.

BAILLY N, POUND-LANA GEN, KLUMPERMAN B. Synthesis, characterization, and self-assembly of poly(*N*-vinylpyrrolidone)-*block*-poly(vinyl acetate). *Australian Journal of Chemistry* 2012; **65** : 1124-1131.

BAILLY N, THOMAS M, KLUMPERMAN B. Poly(*N*-vinylpyrrolidone)-*block*-poly(vinyl acetate) as a drug delivery vehicle for hydrophobic drugs. *Biomacromolecules* 2012; **13** : 4109-4117.

BATISAI E, LUSI M, JACOBS T, BARBOUR LJ. A mechanochemically synthesised solid solution enables engineering of the sorption properties of a Werner clathrate. *Chemical Communications* 2012; **48** : 12171-12173.

BAYLEY GM, MALLON PE. Porous microfibers by the electrospinning of amphiphilic graft copolymer solutions with multi-walled carbon nanotubes. *Polymer* 2012; **53** : 5523-5539.

BEELDERS T, KALILI KM, JOUBERT E, DE BEER D, DE VILLIERS AJ. Comprehensive two-dimensional liquid chromatographic analysis of rooibos (*Aspalathus linearis*) phenolics. *Journal of Separation Science* 2012; **35** : 1808-1820.

BEELDERS T, SIGGE GO, JOUBERT E, DE BEER D, DE VILLIERS AJ. Kinetic optimisation of the reversed phase liquid chromatographic separation of rooibos tea (*Aspalathus linearis*) phenolics on conventional high performance liquid chromatographic instrumentation. *Journal of Chromatography A* 2012; **1219** : 128-139.

CHAKRAVORTY S, RAYNER MK, DE KONING CB, VAN VUUREN SF, VAN OTTERLO WAL. Synthesis and antimicrobial activity of the essential oil compounds (*E*)- and (*Z*)-3-hexenyl nonanoate and two

analogues. *South African Journal of Chemistry-Suid-Afrikaanse Tydskrif Vir Chemie* 2012; **65** : 202-205.

CHERUTHAZHEKATT S, PIJPER S, HARDING GW, MATHOT VBF, PASCH H. Compositional analysis of an impact polypropylene copolymer by fast scanning DSC and FTIR of TREF-SEC cross-fractions. *Macromolecules* 2012; **45** : 5866-5880.

CHERUTHAZHEKATT S, PIJPER S, HARDING GW, MATHOT VBF, PASCH H. Multidimensional analysis of the complex composition of impact polypropylene copolymers: Combination of TREF, SEC-FTIR-HPer DSC, and high temperature 2D-LC. *Macromolecules* 2012; **45** : 2025-2034.

CHIROWODZA H, HARTMANN PC, PASCH H. MALDI-TOF MS analysis of the grafting of clay nanoparticles with poly(butyl acrylate). *Macromolecular Chemistry and Physics* 2012; **213** : 847-857.

DAS S, BHAR K, CHATTOPADHYAY S, MITRA P, SMITH VJ, BARBOUR LJ, GHOSH BK. Syntheses, structures and luminescence behaviours of Group 12 metal(II) thiocyanate complexes with a tetradentate Schiff base: Variation in molecular and crystalline architectures with the change of congeneric metal ions. *Polyhedron* 2012; **38** : 26-35.

DAVIS JC, BÜHL M, KOCH KR. On the origin of ^{35/37}Cl isotope effects on ¹⁹⁵Pt NMR chemical shifts. A density functional study. *Journal of Chemical Theory and Computation* 2012; **8** : 1344-1350.

DE BEER D, SCHULZ AE, JOUBERT E, DE VILLIERS AJ, MALHERBE CJ, STANDER MA. Food ingredient extracts of *Cyclopia subternata* (Honeybush): Variation in phenolic composition and antioxidant capacity. *Molecules* 2012; **17** : 14602-14624.

DE FREITAS JN, MAMO MA, MAUBANE M, VAN OTTERLO WAL, COVILLE NJ, NOGUEIRA AF. Nanocomposites of gold and poly(3-hexylthiophene) containing fullerene moieties: Synthesis, characterization and application in solar cells. *Journal of Power Sources* 2012; **215** : 99-108.

DE GOEDE E, MALLON PE, PASCH H. Using crystallisation fractionation to monitor thermo-oxidative degradation of impact poly(propylene) copolymers. *Macromolecular Materials and Engineering* 2012; **297** : 26-38.

DE JAGER JJ, SMITH VJ. 1-[(1-Methyl-1H-imidazol-5-yl)methyl]-1H-indole-5-carbonitrile. *Acta Crystallographica Section E-Structure Reports Online* 2012; **068** : 3486.

DE VILLERS KA, GILDENHUYS J, LE ROEX T. Iron(III) protoporphyrin IX complexes of the antimalarial *Cinchona* alkaloids quinine and quinidine. *ACS Chemical Biology* 2012; **7** : 666-671.

DE VILLIERS AJ, ALBERTS P, TREDOUX AGJ, NIEUWOUTD HH. Analytical techniques for wine analysis: An African perspective; a review. *Analytica Chimica Acta* 2012; **730** : 2-23.

DOBZANSKA L, JULIUS GR, STANDER-GROBLER E, BURGER Y, NOGAI SD, CRONJE S, RAUBENHEIMER HG. Remote and alpha-thio carbene complexes derived from an oxazoliny-substituted thiophene. *Zeitschrift Fur Naturforschung Section B-A Journal of Chemical Sciences* 2012; **67** : 509-518.

DOBZANSKA L, STANDER-GROBLER E, STRASSER CE, CRONJE S, RAUBENHEIMER HG. Coordination of ligands that contain thiocarbonyl, carbonyl, or thiolate functionalities to complex fragments of palladium in various oxidation states. *Helvetica Chimica Acta* 2012; **95** : 2528-2543.

DOBZANSKA L, STRASSER CE, SCHMIDBAUR H, RAUBENHEIMER HG. 18-Membered heterometallic gold(I) compounds: Structural influences of co-crystallized solvent. *Zeitschrift Fur Naturforschung Section B-A Journal of Chemical Sciences* 2012; **67** : 1115-1122.

DU PLESSIS M, BARBOUR LJ. Supramolecular isomerism and solvatomorphism in a novel coordination compound. *Dalton Transactions* 2012; **41** : 3895.

FANTONI R, SALARI JWO, KLUMPERMAN B. Structure of colloidosomes with tunable particle density: Simulation versus experiment. *Physical Review E* 2012; **85** : 10.

GABRIELLI WF, NOGAI SD, NELL MJ, CRONJE S, RAUBENHEIMER HG. Neutral mononuclear and dinuclear complexes of gold(I) featuring azole ligands: synthesis, structure and cytotoxicity. *Polyhedron* 2012; **34** : 188-197.

GESWINDT TE, GERBER WJ, BRAND DJ, KOCH KR. ³⁵Cl/³⁷Cl isotope effects in ¹⁰³Rh NMR of [RhCl₂(H₂O)₆]³⁺ complex anions in hydrochloric acid solution as a unique 'NMR finger-print' for unambiguous speciation. *Analytica Chimica Acta* 2012; **730** : 93-98.

GETLIK M, GRÜTTER C, SIMARD JR, NGUYEN HD, ROBUBI A, AUST B, VAN OTTERLO WAL, RAUH D. Structure-based design,

synthesis and biological evaluation of *N*-pyrazole, *N'*-thiazole urea inhibitors of MAP kinase p38alpha. *European Journal of Medicinal Chemistry* 2012; **48** : 1-15.

GETLIK M, SIMARD JR, TERMATHE M, GRÜTTER C, RABILLER M, VAN OTTERLO WAL, RAUH D. Fluorophore labeled kinase detects ligands that bind within the MAPK insert of p38alpha kinase. *PLoS ONE* 2012; **7**(7) : 10.

GREESH NGI, SANDERSON RD, HARTMANN PC. Preparation of poly(styrene-*b*-2-hydroxyethyl acrylate) block copolymer using reverse iodine transfer polymerization. *Journal of Applied Polymer Science* 2012; **126** : 1773-1783.

GREESH NGI, SANDERSON RD, HARTMANN PC. Preparation of polystyrene colloid particles armored by clay platelets via dispersion polymerization. *Polymer* 2012; **53** : 708-718.

GREESH NGI, SANDERSON RD, HARTMANN PC. Preparation of polystyrene-clay nanocomposites via dispersion polymerization using oligomeric styrene-montmorillonite as stabilizer. *Polymer International* 2012; **61** : 834-843.

GROENEWALD F, DILLEN JLM. Conformational analysis of caprolactam, cycloheptane and caprolactone. *Structural Chemistry* 2012; **23** : 723-732.

GROENEWALD F, ESTERHUYSEN C, DILLEN JLM. Extensive theoretical investigation: influence of the electrostatic environment on the I₃⁻... I₃⁻ anion-anion interaction. *Theoretical Chemistry Accounts* 2012; **131** : 1281.

GULE NP, BSHENA OESS, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B. Immobilized furanone derivatives as inhibitors for adhesion of bacteria on modified poly(styrene-co-maleic anhydride). *Biomacromolecules* 2012; **13** : 3138-3150.

GULE NP, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B. Electrospun poly(vinyl alcohol) nanofibres with biocidal additives for application in filter media, 1 Properties affecting fibre morphology and characterisation. *Macromolecular Materials and Engineering* 2012; **297** : 609-617.

GULE NP, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B. Electrospun poly(vinyl alcohol) nanofibres with biocidal additives for application in filter media, 2 Antimicrobial activity, regeneration, leaching and water stability. *Macromolecular Materials and Engineering* 2012; **297** : 618-626.

HASSAM M, BASSON AE, LIOTTA DC, MORRIS L, VAN OTTERLO WAL, PELLY SC. Novel cyclopropyl-indole derivatives as HIV non-nucleoside reverse transcriptase inhibitors. *ACS Medicinal Chemistry Letters* 2012; **3** : 470-475.

HASSAM M, SMITH VJ. 5-Chloro-1-(4-methylphenylsulfonyl)-1H-indole. *Acta Crystallographica Section E-Structure Reports Online* 2012; **068** : 3357.

HEHN M, HILLER W, WAGNER T, THIEL J, PASCH H. Molar mass and microstructure analysis of PI-*b*-PMMA copolymers by SEC-NMR. *Macromolecular Chemistry and Physics* 2012; **213** : 401-410.

HILLER W, HEHN M, SINHA PP, RAUST J-A, PASCH H. Online coupling of two-dimensional liquid chromatography and NMR for the analysis of complex polymers. *Macromolecules* 2012; **45** : 7740-7748.

HORVATH UEI, DOBZANSKA L, STRASSER CE, BOUWER W, JOONÉ G, JANSEN VAN RENSBURG CE, CRONJE S, RAUBENHEIMER HG. Amides of gold(I) diphosphines prepared from *N*-heterocyclic sources and their *in vitro* and *in vivo* screening for anticancer activity. *Journal of Inorganic Biochemistry* 2012; **111** : 80-90.

HUSSAIN H, HUSSAIN J, AL-HARRASI A, GREEN IR. Chemistry and biology of the genus *Vaccanga*. *Pharmaceutical Biology* 2012; **50**(9) : 1183-1193.

HUSSAIN H, HUSSAIN J, AL-HARRASI A, SALEEM M, GREEN IR, VAN REE T, GHULAM A. Chemistry and biology of genus *Vismia*. *Pharmaceutical Biology* 2012; **50**(11) : 1448-1462.

JACOBS JJ, POUND-LANA GEN, KLUMPERMAN B. Poly(*N*-vinylpyrrolidone-*b*-(gamma-benzyl-L-glutamate)) – Synthesis and self-assembly into pH-sensitive micelles. *Polymer Chemistry* 2012; **3** : 2551-2560.

JACOBS T, LLOYD GO, GERTENBACH J, MÜLLER-NEDEBOCK KK, ESTERHUYSEN C, BARBOUR LJ. In situ x-ray structural studies of a flexible host responding to incremental gas loading. *Angewandte Chemie-International Edition* 2012; **51** : 4913-4916.

JOUBERT E, BEELDERS T, DE BEER D, MALHERBE CJ, DE VILLIERS AJ, SIGGE GO. Variation in phenolic content and antioxidation activity of fermented rooibos herbal tea infusions: Role of production season and quality grade. *Journal of Agricultural and Food Chemistry* 2012; **60** : 9171-9179.

KALILI KM, CABOOTER D, DESMET G, DE VILLIERS AJ. Kinetic optimisation of the reversed phase liquid chromatographic separation of proanthocyanidins on sub-2 micrometer and superficially porous phases. *Journal of Chromatography A* 2012; **1236** : 63-76.

KAPPO MA, EISO AB, HASSEM F, ATKINSON RA, FARO A,

- VICTOR M, MALAUDZ T, POOLE JO, MCKENZIE JM, CHIBI M, MOOLMAN-SMOOK JC, REES DJG, PUGH DJR.** Solution structure of the RING Finger-like domain of Retinoblastoma Binding Protein-6 (RBBP6) Suggests it functions as a U-Box. *Journal of Biological Chemistry* 2012; **287**(10) : 7146-7158.
- KRIEL H, SANDERSON RD, SMIT AE.** Coaxial electrospinning of miscible PLLA-core and PDLLA-shell solutions and indirect visualisation of the core-shell fibres obtained. *Fibres & Textiles in Eastern Europe* 2012; **20**(2(91)) : 28-33.
- LE ROUX M, CRONJE JC, BURGER BV, JOUBERT E.** Characterization of volatiles and aroma-active compounds in honeybush (*Cyclopia subternata*) by GC-MS and GC-O analysis. *Journal of Agricultural and Food Chemistry* 2012; **60** : 2657-2664.
- LOOTS L-A, BARBOUR LJ.** A simple and robust method for the identification of pi-pi packing motifs of aromatic compounds. *CrystEngComm* 2012; **14** : 300-304.
- LOOTS L-A, WAHL H, VAN DER WESTHUIZEN L, HAYNES DA, LE ROEX T.** Interconversion between different stoichiometric forms of a three-component crystal via liquid-assisted grinding. *Chemical Communications* 2012; **48** : 11507-11509.
- LUCHETTI G, JOHNSTON R, MATHIEU V, LEFRANC F, HAYDEN K, ANDOLFI A, LAMORAL-THEYS D, REISENAUER MR, CHAMPION C, PELLY SC, VAN OTTERLO WAL, MAGEDOV IV, KISS R, EVIDENTE A, ROGELJ S, KORNIENKO A.** Bulbispermine: A crinine-type amaryllidaceae alkaloid exhibiting cytostatic activity toward apoptosis-resistant glioma cells. *ChemMedChem* 2012; **7** : 815-822.
- LUSI M, BARBOUR LJ.** Solid-vapor sorption of xylenes: Prioritized selectivity as a means of separating all three isomers using a single substrate. *Angewandte Chemie-International Edition* 2012; **51** : 3928-3931.
- MAHAMO T, MOGOROSI MM, MOSS JR, MAPOLIE SF, SLOOTWEG JC, LAMMERTSMA K, SMITH GS.** Neutral palladium(I) complexes with P,N Schiff-base ligands: Synthesis, characterization and application as Suzuki-Miyaura coupling catalysts. *Journal of Organometallic Chemistry* 2012; **703** : 34-42.
- MAITHUFI MN, JOUBERT DJ, KLUMPERMAN B.** Synthesis and evaluation of comb-type copolymers prepared via atom transfer radical polymerization as possible cold flow improvers in GTL diesel fuels. *Journal of Applied Polymer Science* 2012; **124** : 2766-2776.
- MAKAN AC, OTTE T, PASCH H.** Analysis of high molar mass branched polybutadienes by SEC-MALLS and AF4-MALLS. *Macromolecules* 2012; **45** : 5247-5259.
- MALGAS-ENUS R, MAPOLIE SF.** A novel nickel (II) complex based on a cyclam-cored generation-one dendrimeric salicylaldimine ligand and its application as a catalyst precursor in norbornene polymerization: Comparative study with some other first generation DAB-polypropyleneimine metalodendrimers. *Polyhedron* 2012; **47** : 87-93.
- MALIK MI, HARDING GW, GRABOWSKY ME, PASCH H.** Two-dimensional liquid chromatography of polystyrene-polyethylene oxide block copolymers. *Journal of Chromatography A* 2012; **1244** : 77-87.
- MALIK MI, HARDING GW, PASCH H.** Two-dimensional liquid chromatography of PDMS-PS block copolymers. *Analytical and Bioanalytical Chemistry* 2012; **403** : 601-611.
- MALINGA SP, AROTIBA OA, KRAUSE RW, MAPOLIE SF, MAMBA BB.** Synthesis and characterization of generation 2 and 3 poly(propylene imine) dendrimer capped NiFe nanoalloy. *Materials Letters* 2012; **68** : 324-326.
- MASS V, RODE K, RITTIG F, OSTROWSKI T, PASCH H.** Analysis of fatty alcohol ethoxylates regarding chain length and endgroups by MALDI-TOF MS using collision-induced dissociation. *Macromolecular Chemistry and Physics* 2012; **213** : 747-756.
- MAUBANE MS, MAMO MA, NXUMALO EN, VAN OTTERLO WAL, COVILLE NJ.** Tubular shaped composites made from polythiophene covalently linked to Prato functionalized N-doped carbon nanotubes. *Synthetic Metals* 2012; **162** : 2307-2315.
- MONGWAKETSI N, KHAMLICH S, KLUMPERMAN B, SPARROW R, MAAZA M.** Synthesis and characterisation of porphyrin nanotubes/rods for solar radiation harvesting and solar cells. *Physica B-Condensed Matter* 2012; **407** : 1615-1619.
- MORGANS GL, YADAV DB, FERNANDES MA, DE KONING CB, MICHAEL JP, VAN OTTERLO WAL.** Formation of an unexpected rearrangement product using Grubb's second generation catalyst: 2-allyl-3,4-dihydro-2H-1,4-benzothiazines from diene precursors. *Tetrahedron Letters* 2012; **53** : 2384-2387.
- MURRAY P, GERBER WJ, KOCH KR.** ^{35/37}Cl and ^{16/18}O isotope resolved ¹⁹⁵Pt NMR: unique spectroscopic 'fingerprints' for unambiguous speciation of [PtCl_n(H₂O)_{6-n}]⁴⁻ⁿ (n = 2-5) complexes in an acidic aqueous solution. *Dalton Transactions* 2012; **41** : 10533-10542.
- NAVARRETE P, PIZZI A, PASCH H, DELMOTTE L.** Study of lignin-glyoxal reaction by MALDI-TOF and CP-MAS ¹³C NMR. *Journal of Adhesion Science and Technology* 2012; **26** : 1069-1082.
- NAVARRETE P, PIZZI A, TAPIN-LINGUA S, BENJELLOUN-MLAYAH B, PASCH H, RODE K, DELMOTTE L, RIGOLET S.** Low formaldehyde emitting biobased wood adhesives manufactured from mixtures of tannin and glyoxylated lignin. *Journal of Adhesion Science and Technology* 2012; **26** : 1667-1684.
- PIZZI A, PASCH H, CELZARD A, SZCZUREK A.** Oligomer distribution at the gel point of tannin-resorcinol-formaldehyde cold-set wood adhesives. *Journal of Adhesion Science and Technology* 2012; **26** : 79-88.
- RAUBENHEIMER HG, SCHMIDBAUR H.** Gold chemistry guided by the isolobality concept. *Organometallics* 2012; **31** : 2507-2522.
- RAUBENHEIMER HG.** Asikliese karbeenkomplekse maak eerste opslae in goudstormloop. *Litnet Akademies* 2012; **9**(3) : 35.
- RAUBENHEIMER HG.** Monomeric linear diaminocarbene complexes of gold(I) show merit in enantioselective catalysis. *Angewandte Chemie-International Edition* 2012; **51** : 5042-5044.
- REYNOLDS C, DE KONING CB, PELLY SC, VAN OTTERLO WAL, BODE ML.** In search of a treatment of HIV - current therapies and the role of non-nucleoside reverse transcriptase inhibitors (NNRTIs). *Chemical Society Reviews* 2012; **41** : 4657-4670.
- SHEBANI AN, VAN REENEN AJ, MEINCKEN M.** Using extractive-free wood as a reinforcement in wood-LLDPE composites. *Journal of Reinforced Plastics and Composites* 2012; **31**(4) : 225-232.
- SIBANYONI JM, BAGIHALLI GB, MAPOLIE SF.** Binuclear Pd-methyl complexes of N,N'-{1, n}-alkanediyl-bis(pyridinyl-2-methanimine) ligands (n = 5, 8, 9, 10 and 12): Evaluation as catalysts precursors for phenylacetylene polymerization. *Journal of Organometallic Chemistry* 2012; **700** : 93-102.
- SINHA PP, HARDING GW, MAIKO KG, HILLER W, PASCH H.** Comprehensive two-dimensional liquid chromatography for the separation of protonated and deuterated polystyrene. *Journal of Chromatography A* 2012; **1265** : 95-104.
- SINHA PP, HILLER W, BELLAS V, PASCH H.** Analysis of polystyrene-*b*-polyisoprene copolymers by coupling of liquid chromatography at critical conditions to NMR at critical conditions of polystyrene and polyisoprene. *Journal of Separation Science* 2012; **35** : 1731-1740.
- TAHER A, SMITH VJ.** N-(2-Aminopyridin-3-yl)-4-methyl-N-(4-methylphenylsulfonyl)benzene-sulfonamide. *Acta Crystallographica Section E-Structure Reports Online* 2012; **068** : 1136.
- TAHER A, SMITH VJ.** N-(4-Aminopyrimidin-5-yl)-4-methyl-N-(4-methylphenylsulfonyl)benzene-sulfonamide. *Acta Crystallographica Section E-Structure Reports Online* 2012; **068** : 3362.
- TIGGELMAN I, PASCH H, HARTMANN PC.** Rapid comparison of mineral oils vapor transmission rate through paper and board packaging materials. *Tappi Journal* 2012; **11**(6) : 41-47.
- VAN DER WESTHUIZEN R, HAMMONS JC, MEIER JL, DAHESH S, MOOLMAN WJA, PELLY SC, NIZET V, BURKART MD, STRAUSS E.** The antibiotic CJ-15,801 is an antimetabolite that hijacks and then inhibits CoA biosynthesis. *Chemistry & Biology* 2012; **19** : 559-571.
- VAN REENEN AJ, BASSON NC.** Molecular composition and properties of impact propylene copolymers. *EXPRESS POLYMER LETTERS* 2012; **6**(5) : 427-436.
- VAN WYK P, GERBER WJ, KOCH KR.** A robust method for speciation, separation and photometric characterization of all [PtCl_{6-n}Br_n]²⁻ (n = 0-6) and [PtCl_{4-n}Br_n]²⁻ (n = 0-4) complex anions by means of ion-pairing RP-HPLC coupled to ICP-MS/OES, validated by high resolution ¹⁹⁵Pt NMR spectroscopy. *Analytica Chimica Acta* 2012; **704** : 154-161.
- VAN WYK P, GERBER WJ, KOCH KR.** Direct determination of metal to halide mole ratios in platinum complex anions [PtCl_{6-n}Br_n]²⁻ (n = 0-6) by means of HPLC-ICP-OES using Cl, Br and Pt emissions of all separated species. *Journal of Analytical Atomic Spectrometry* 2012; **27** : 577-580.
- WAHL H, HAYNES DA, LE ROEX T.** A series of polymorphs of hexakis(4-fluorophenoxy)cyclotriphosphazene. *Crystal Growth & Design* 2012; **12** : 4031-4038.
- WAHL H, HAYNES DA, LE ROEX T.** Porous salts based on the pamoate ion. *Chemical Communications* 2012; **48** : 1775-1777.
- WILLIAMS NJ, GEPHART III RT, HAMES AE, REIBENSPIES JH, LUCKAY RC, DE SOUSA AS, HANCOCK RD.** Affinity of two highly preorganized ligands for the base metal ions Co(II), Ni(II) and Cu(II): A

thermodynamic, crystallographic and fluorometric study. *Polyhedron* 2012; **46** : 139-148.

WRIGHT TG, CHIROWODZA H, PASCH H. NMR studies on the mechanism of reverse iodine transfer polymerization of styrene. *Macromolecules* 2012; **45** : 2995-3003.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

BASSON NC, VAN REENEN AJ. The effect of compatibilizer on the properties of impact poly(propylene)-wood composites. *Macromolecular Symposia* 2012; **315** : 30-34.

BLACKIE MAL. A Popperian perspective on science education. *International Journal of Higher Education* 2012; **1**(1) : 160-167.

CHIROWODZA H, WEBER WG, HARTMANN PC, PASCH H. Surface-initiated reversible addition fragmentation chain transfer (RAFT) polymerization of styrene from laponite clay surfaces. *Macromolecular Symposia* 2012; **313-314** : 135-145.

HLALELE L, KLUMPERMAN B. Terminal monomer units in dormant and active copolymer chains. *ACS Symposium Series* 2012; **1100** : 47-58.

MAUTJANA N, PASCH H. Matrix-assisted laser desorption ionization mass spectrometry of synthetic polymers. *Macromolecular Symposia* 2012; **313-314** : 157-161.

PASCH H, DE GOEDE E, MALLON PE. Multidimensional analytical techniques for studying the thermo-oxidative degradation of impact poly(propylene). *Macromolecular Symposia* 2012; **312** : 174-190.

PRETORIUS NO, SIMPSON JM, MCLEARY JB, PASCH H. The combination of liquid chromatography and mass spectrometry techniques for the characterization of aliphatic polyesters. *Macromolecular Symposia* 2012; **313-314** : 170-181.

SINHA PP, GRABOWSKY ME, MALIK MI, HARDING GW, PASCH H. Characterization of polystyrene-block-polyethylene oxide diblock copolymers and blends of homopolymers by liquid chromatography at critical conditions (LCCC). *Macromolecular Symposia* 2012; **313-314** : 162-169.

Doktoraal Afgehandel/Doctoral completed

ALBERTS P. Applications of liquid chromatography – tandem mass spectrometry to wine analysis: Targeted analysis and compound identification. PhD, 2012. 218 pp. Supervisor: De Villiers AJ. Cosupervisor: Stander M.

BAILLY N. N-Vinylpyrrolidone - vinyl acetate block copolymers as drug delivery vehicles. PhD, 2012. 133 pp. Supervisor: Klumperman B.

BRAND M. The use of laser light scattering to study solution crystallization phenomena in polyolefins. PhD, 2012. 104 pp. Supervisor: Van Reenen AJ.

BSHENA OESS. Synthesis of permanent non-leaching antimicrobial polymer nanofibers. PhD, 2012. 164 pp. Supervisor: Klumperman B.

CHIROWODZA H. Polymer-clay nanocomposites prepared by RAFT-supported grafting. PhD, 2012. 140 pp. Supervisor: Pasch H. Cosupervisor: Hartmann PC.

CRONJE L. Surface modification of styrene maleic anhydride nanofibers for efficient capture of *Mycobacterium tuberculosis*. PhD, 2012. 201 pp. Supervisor: Klumperman B.

DU TOIT A. The use of chromium/bis(diphenylphosphino)amine catalysis in tandem ethylene copolymerization processes. PhD, 2012. 146 pp. Supervisor: Van Reenen AJ.

ETMIMI HM. New approaches to the synthesis and exfoliation of polymer/functional graphene nanocomposites by miniemulsion polymerization. PhD, 2012. 200 pp. Supervisor: Sanderson RD. Cosupervisor: Mallon PE.

GULE NP. Electrospun antimicrobial and antibiofouling nanofibres. PhD, 2012. 177 pp. Supervisor: Klumperman B. Cosupervisor: Cloete TE.

HEYNS A. Guest-induced flexibility in crystals. PhD, 2012. 207 pp. Supervisor: Barbour LJ.

KLUMPERMAN B. NMR studies of radical polymerisation processes. DSc, 2012. 87 pp. Supervisor: Mallon PE.

LAMPRECHT DA. Studies in Mycothiol Biosynthesis: Identification, characterization and the in vitro reconstitution of the *Mycobacterium tuberculosis* pathway enzymes. PhD, 2012. 119 pp. Supervisor: Strauss E. Cosupervisor: Jardine A.

LOOTS L-A. The structural analysis of imidazole-functionalised metallocycles. PhD, 2012. 208 pp. Supervisor: Barbour LJ.

MUGO JN. Polymerization and oligomerization reactions mediated by metalloendrimers of zinc and palladium. PhD, 2012. 1 pp. Supervisor: Mapolie SF.

MURRAY P. A speciation study on various Pt(II) and Pt(IV) complexes including hexa-aqua-platinum(IV) by means of ¹⁹⁵Pt NMR spectroscopy, in support of a preliminary study of oxidation mechanism of various Pt(II) complexes. PhD, 2012. 205 pp. Supervisor: Koch KR.

PFUKWA R. Hierarchical self-assembly of novel para-aryltriazole helical foldamers. PhD, 2012. 142 pp. Supervisor: Klumperman B. Cosupervisor: Rowan AE.

POTTS S. Inclusion studies of metal-organic hosts. PhD, 2012. 241 pp. Supervisor: Barbour LJ. Cosupervisor: Haynes DA.

ROOTMAN-LE GRANGE I. Conenzyme A in biocatalysis: Enzyme characterization and process development. PhD, 2012. 120 pp. Supervisor: Strauss E.

ZENGENI E. Highly filled water based polymer/clay hybrid latexes. PhD, 2012. 144 pp. Supervisor: Pasch H.

Fisika | Physics

Tydskrifartikels (gesubsidieer) / Journal Articles (subsided)

CHEN YY, LI L, LIANG HZ, MENG J. Density-dependent deformed relativistic Hartree-Bogoliubov theory in continuum. *Physical Review C* 2012; **85** : 067301-1-5.

COWLEY AA, VAN ZYL JJ, DIMITROVA SS, ZEMLYANAYA EV, LUKYANOV KV. Mechanism of the ⁹³Nb(p,³He) inclusive reaction at an incident energy of 160 MeV. *Physical Review C* 2012; **85** : 054622-1-8.

ERASMUS N, EICHBERGER M, HAUPT K, BOSHOFF I, KASSIER GH, BIRMURSKE R, BERGER H, DEMSAR J, SCHWOERER HPH. Ultrafast dynamics of charge density waves in 4H_b-TaSe₅ probed by femtosecond electron diffraction. *Physical Review Letters* 2012; **109** : 167402-1-5.

FREER M, ITOH M, KAWABATA T, FUJITA H, AKIMUNE H, BUTHELEZI EZ, CARTER J, FEARICK RW, PAPKA P, SWARTZ JA, ET AL. Consistent analysis of the 2⁺ excitation of the ¹²C Hoyle state populated in proton and alpha-particle inelastic scattering. *Physical Review C* 2012; **86** : 034320-1-6.

IBRAHIM TT, OYEWUMI KJ, WYNGAARDT SM. Analytical solution of N-dimensional Klein-Gordon and Dirac equations with Rosen-Morse potential. *European Physical Journal Plus* 2012; **127** : 1-9.

IBRAHIM TT, PEREZ SM, WYNGAARDT SM, BUCK B, MERCHANT AC. Hybrid potential analysis of exotic clustering in heavy nuclei. *Physical Review C* 2012; **85** : 044313-1-4.

KASSIER GH, ERASMUS N, HAUPT K, BOSHOFF I, SIEGMUND R, COELHO SMM, SCHWOERER HPH. Photo-triggered pulsed cavity compressor for bright electron bunches in ultrafast electron diffraction. *Applied Physics B-Lasers and Optics* 2012; **109** : 249-257.

LI L, MENG J, RING P, ZHAO E-G, ZHOU S-G. Deformed relativistic Hartree-Bogoliubov theory in continuum. *Physical Review C* 2012; **85** : 024312-1-17.

LI L, MENG J, RING P, ZHAO E-G, ZHOU S-G. Odd systems in deformed relativistic Hartree Bogoliubov theory in continuum. *Chinese Physics Letters* 2012; **29**(4) : 042101-1-4.

LI ZP, LI CY, XIANG J, YAO JM, MENG J. Enhanced collectivity in neutron-deficient Sn isotopes in energy functional based collective Hamiltonian. *Physics Letters B* 2012; **717** : 470-473.

LIANG HZ, ZHAO P-W, MENG J. Fine structure of charge-exchange spin-dipole excitations in ¹⁶O. *Physical Review C* 2012; **85** : 064302-1-5.

LIANG HZ, ZHAO P-W, RING P, ROCA-MAZA X, MENG J. Localized form of Fock terms in nuclear covariant density functional theory. *Physical Review C* 2012; **86** : 021302-1-5.

MCLAREN MG, AGNEW M, LEACH J, ROUX FS, PADGETT MJ, BOYD RW, FORBES A. Entangled Bessel-Gaussian beams. *Optics Express* 2012; **20**(21) : 23589-23597.

MEI H, XIANG J, YAO JM, LI ZP, MENG J. Rapid structural change in low-lying states of neutron-rich Sr and Zr isotopes. *Physical Review C* 2012; **85** : 034321-1-9.

NIU YF, COLO G, BRENNAN M, BORTIGNON PF, MENG J. Gamow-Teller response within Skyrme random-phase approximation plus particle-vibration coupling. *Physical Review C* 2012; **85** : 034314-1-11.

ROBERTS DE, DU PLESSIS A, STEYN J, BOTHA LR, PITAYANA S, BERGER LR. An investigation of Laser Induced Breakdown Spectroscopy for use as a control in the laser removal of rock from fossils found at the Malapa hominin site, South Africa. *Spectrochimica Acta Part B-Atomic Spectroscopy* 2012; **73** : 48-54.

ROHWER EJ, RICHTER C, HEMING N, STRAUCH K, LITWINSKI C, NYOKONG T, SCHLETTWEIN D, SCHWOERER HPH. Ultrafast Photodynamics of the Indoline Dye D149 Adsorbed to Porous ZnO in Dye-Sensitized Solar Cells. *Chemphyschem* 2013 Jan 14; **14**(1):132-9. DOI: 10.1002/cphc.201200715.

ROMERO J, GIOVANNINI D, MCLAREN MG, GALVEZ EJ, FORBES, PADGETT MJ. Orbital angular momentum correlations with a phase-flipped Gaussian mode pump beam. *Journal of Optics* 2012; **14**(8) : 085401-1-5.

SMIT FD, NEMULODI F, BUTHELEZI EZ, CARTER J, FEARICK RW, FÖRTSCH SV, FREER M, FUJITA H, JINGO M, KUREBA CO, MABIALA J, MIRA J, NEVELING R, PAPKA P, STEYN GF, SWARTZ JA, USMAN I, VAN ZYL JJ. No evidence of an 11.16 MeV 2+ state in ¹²C. *Physical Review C* 2012; **86** : 037301-1-3.

SUN TT, SUN BY, MENG J. BCS-BEC crossover in nuclear matter with the relativistic Hartree-Bogoliubov theory. *Physical Review C* 2012; **86** : 014305-1-7.

VRETEGAR D, NIU YF, PAAR N, MENG J. Low-energy isovector and isoscalar dipole response in neutron-rich nuclei. *Physical Review C* 2012; **85** : 044317-1-8.

WANG SY, SUN DP, QI B, CHEN ZQ, HU XB, WANG G, LIU C, XU CJ, LIU L, ZHANG P, LI ZQ, GUO MZ, WYNGAARDT SM. Collective and noncollective states in ¹¹⁶Sb. *Physical Review C* 2012; **719** : 68-75.

WEI J, LI J, MENG J. Relativistic Descriptions of Nuclear Magnetic Moments. *Progress of Theoretical Physics Supplement* 2012; **196** : 400-406.

XIANG J, LI ZP, LI ZX, YAO JM, MENG J. Covariant description of shape evolution and shape coexistence in neutron-rich nuclei at *N* = 60. *Nuclear Physics A* 2012; **873** : 1-16.

YU LF, ZHAO P-W, ZHANG SQ, RING P, MENG J. Magnetic rotations in ¹⁹⁸Pb and ¹⁹⁹Pb within covariant density functional theory. *Physical Review C* 2012; **85** : 024318-1-10.

ZHAO P-W, PENG J, LIANG HZ, RING P, MENG J. Covariant density functional theory for antimagnetic rotation. *Physical Review C* 2012; **85** : 054310-1-14.

Doktoraal Afgehandel/Doctoral completed

BIRECH Z. *Exciton Dynamics in Tetracene Single Crystals Studied Using Nonlinear Femtosecond Laser Spectroscopy*. PhD, 2012. 73 pp. Supervisor: Schwoerer HPH. Cosupervisor: Rohwer EG.

BOSMAN GW. *Transient Absorption Spectroscopy Of Metal Complexes: Dithizonatophenylmercury (II) And Derivatives*. PhD, 2012. 89 pp. Supervisor: Schwoerer HPH. Cosupervisor: Rohwer EG.

DIENER JPW. *Ferromagnetic phase transitions in neutron stars*. PhD, 2012. 147 pp. Supervisor: Scholtz FG. Cosupervisor: Geyer HB, Hillhouse GC.

SINGO D. *Development of a High Flux Neutron Radiation Detection System For In-Core Temperature Monitoring*. PhD, 2012. 179 pp. Supervisor: Papka P. Cosupervisors: Wyngaardt SM, Dobson T, Smit FD.

VAN ZYL JJ. *Two-nucleon transfer in the ⁵⁸Ni(*p*,³He)⁵⁶Co reaction at incident energies of 80, 100 and 120 MeV*. PhD, 2012. 146 pp. Supervisor: Cowley A. Cosupervisor: Neveling R.

Fisiologiese Wetenskappe | Physiological Sciences

Tydskrifartikels (gesubsidieer) /Journal Articles (subsidised)

BAILLY N, THOMAS M, KLUMPERMAN B. Poly(*N*-vinylpyrrolidone)-*block*-poly(vinyl acetate) as a drug delivery vehicle for hydrophobic drugs. *Biomacromolecules* 2012; **13** : 4109-4117.

BOTHA M, BOTES M, LOOS B, SMITH C, DICKS LMT. *Lactobacillus equigenosus* Strain LeI Invades Equine Epithelial Cells. *Applied and Environmental Microbiology* 2012; **78**(12) : 4248-4255.

HECKER PA, MAPANGA RF, KIMAR C, REBIERO RF, BROWN BH, O'CONNELL KA, COX JW, SHEKAR KC, ASEMU G, ESSOP MF, STANLEY WC. Effects of glucose-6-phosphate dehydrogenase deficiency on the metabolic and cardiac responses to obesogenic or high-fructose diets. *American Journal of Physiology-Endocrinology and Metabolism* 2012; **303** : 959-972.

HOFFMAN LC, WOLMARANS WJ, SMITH C, BRAND TS. Effect of transportatoin on ostrich (*Struthio camelus*) weight loss and meat quality. *Animal Production Science* 2012; **52**(12) : 1153-1162.

KLIONSKY DJ, ABDALLA FC, ABELIOVICH H, ABRAHAM RT, ACEVEDO-AROZENA A, ADELI K, AGHOLME L, AGNELLO M, ENGELBRECHT A-M, LOOS B, ET AL. Guidelines for the use and interpretation of assays for monitoring autophagy. *Autophagy* 2012; **8**(4) : 1-100.

KRUGER M, SMITH C. Post-contusion polyphenol treatment alters inflammation and muscle regeneration. *Medicine and Science in Sports and Exercise* 2012; **44**(5) : 872-880.

LACERDA L, OPIE LH, LECOUR S. Influence of Tumour Necrosis Factor Alpha on the Outcome of Ischaemic Postconditioning in the Presence of Obesity and Diabetes. *Experimental Diabetes Research* 2012; **2012** : 1-10.

MACALUSO F, BROOKS N, VAN DE VYVER M, VAN TUBBERGH K, MYBURGH KH. Satellite cell count, VO₂max, and p38 MAPK in inactive to moderately active young men. *Scandinavian Journal of Medicine & Science in Sports* 2012; **22** : 38-44.

MACALUSO F, ISAACS AW, MYBURGH KH. Preferential type II muscle fiber damage from plyometric exercise. *Journal of Athletic Training* 2012; **47**(4) : 414-420.

MACALUSO F, MYBURGH KH. Current evidence that exercise can increase the number of adult stem cells. *Journal of Muscle Research and Cell Motility* 2012; **33** : 187-198.

MAPANGA RF, RAJAMANI U, DLAMINI N, ZUNGU-EDMONDSON M, KELLY-LAUBSCHER R, SHAFIULLAH M, WAHAB A, HASAN MY, FAHIM MA, RONDEAU P, BOURDON E, ESSOP MF. Oleonic Acid: A Novel Cardioprotective Agent that blunts Hyperglycemia-induced Contractile Dysfunction. *PLoS ONE* 2012; **7**(10) : 47322.

MYBURGH KH, KRUGER M, SMITH C. Accelerated skeletal muscle recovery after in vivo polyphenol administration. *Journal of Nutritional Biochemistry* 2012; **23** : 1072-1079.

SISHI BJN, BESTER DJ, WERGELAND A, LOOS B, JONASSEN AK, VAN ROOYEN J, ENGELBRECHT A-M. Daunorubicin therapy is associated with upregulation of E3 ubiquitin ligases in the heart. *Experimental Biology and Medicine* 2012; **237** : 219-226.

SPRINGHORN C, MATSHA TE, ERASMUS RT, ESSOP MF. Exploring Leukocyte O-GlcNAcylation as a Novel Diagnostic Tool for the Earlier Detection of Type 2 Diabetes Mellitus. *Journal of Clinical Endocrinology & Metabolism* 2012; **97**(12) : 4640-4649.

THOMAS M, MILLS J, ENGELBRECHT A-M. Phosphatidylinositol-3-kinase (PI3K) activity decreases in C2C12 myotubes during acute simulated ischemia at a cost to their survival. *Life Sciences* 2012; **91** : 44-53.

VAN DE VYVER M, MYBURGH KH. Cytokine and satellite cell responses to muscle damage: interpretation and possible confounding factors in human studies. *Journal of Muscle Research and Cell Motility* 2012; **33** : 177-185.

Tydskrifartikels (ongesubsidieer) /Journal Articles (non-subsidised)

KATENGUA-THAMAHANE E, ENGELBRECHT A-M, ESTERHUYSE AJ, VAN ROOYEN J. Inhibition of Akt Attenuates RPO-Induced Cardioprotection. *Cardiology Research and Practice* 2012; **2012** : 392457.

Doktoraal Afgehandel/Doctoral completed

SISHI BJN. *Anthracycline-induced cardiotoxicity - the role of proteolytic pathways*. PhD, 2012. 251 pp. Supervisor: Engelbrecht A-M. Cosupervisor: Van Rooyen J.

THOMAS M. *Differential tolerance of a cancer and a non-cancer cell line to amino acid deprivation: mechanistic insight and clinical potential*. PhD, 2012. 330 pp. Supervisor: Engelbrecht A-M. Cosupervisor: Strijdom H.

Instituut vir Polimeerwetenskap | Institute for Polymer Science

Tydskrifartikels (gesubsidieer) /Journal Articles (subsidised)

BAILLY N, POUND-LANA GEN, KLUMPERMAN B. Synthesis, characterization, and self-assembly of poly(*N*-vinylpyrrolidone)-*block*-poly(vinyl acetate). *Australian Journal of Chemistry* 2012; **65** : 1124-1131.

BSHENA O, HEUNIS TDJ, DICKS LMT, KLUMPERMAN B. Antimicrobial fibres: therapeutic possibilities and recent advances. *Future Medicinal Chemistry* 2011; **3**(14) : 1823-1849.

Tydskrifartikels (ongesubsidieer) /Journal Articles (non-subsidised)

PRETORIUS NO, SIMPSON JM, MCLEARY JB, PASCH H. The combination of liquid chromatography and mass spectrometry techniques for the characterization of aliphatic polyesters. *Macromolecular Symposia* 2012; **313-314** : 170-181.

- AVDEENKOV AV.** Dipolar collisions of ultracold polar molecules in a microwave field. *Physical Review A* 2012; **86** : 022707-1-11.
- BODRENKO IV, AVDEENKOV AV, BASSARABOV DG, BIBIKOV AV, NIKOLAEV AV, TARAN MD, TKALYA EV.** Hydrogen Storage in Aromatic Carbon Ring based Molecular Materials Decorated with Alkali or Alkali-Earth Metals. *Journal of Physical Chemistry C* 2012; **116** : 25286-25292.
- FANTONI R, MALIJEVSKY A, SANTOS A, GIACOMETTI A.** Phase diagram of the penetrable-square-well model. *EPL* 2011; **93** : 26002-1-5.
- GANGOPADHYAY S, NARAYAN DEB R, SCHOLTZ FG.** Statistical interparticle potential on noncommutative space. *EPL* 2012; **97** : 21001-1-5.
- HEISS WD.** The physics of exceptional points. *Journal of Physics A-Mathematical and Theoretical* 2012; **45** : 444016-1-11.
- JACOBS T, LLOYD GO, GERTENBACH J, MÜLLER-NEDEBOCK KK, ESTERHUYSEN C, BARBOUR LJ.** In situ x-ray structural studies of a flexible host responding to incremental gas loading. *Angewandte Chemie-International Edition* 2012; **51** : 4913-4916.
- JAFARI S, SHEIKHAN A, ESMailPOUR A, ANVARI M, RAHIMI TABAR MR.** Metal-insulator transition in three-dimensional Anderson superlattice with rough interfaces. *Physical Review B* 2012; **85** : 224204-1-5.
- KASTNER M.** Long-time asymptotics of the long-range Emch-Radin model. *Central European Journal of Physics* 2012; **10** : 637-644.
- KRIEL JN, SCHOLTZ FG.** Eigenvalue distributions from a star product approach. *Journal of Physics A-Mathematical and Theoretical* 2012; **45**(47) : 475204-1-24.
- KRIEL JN, SCHOLTZ FG.** The entropy of dense non-commutative fermion gases. *Journal of Physics A-Mathematical and Theoretical* 2012; **45** : 095301 (1-13).
- MEHTA D, HAUENSTEIN JD, KASTNER M.** Energy-landscape analysis of the two-dimensional nearest-neighbor $(\phi)^4$ model. *Physical Review E* 2012; **85** : 061103-1-10.
- PASKAUSKAS R, KASTNER M.** Equilibration in long-range quantum spin systems from a BBGKY perspective. *Journal of Statistical Mechanics-Theory and Experiment* 2012; **2012**(2) : 02005-1-30.
- PASKAUSKAS R.** Symmetries of a mean-field spin model. *Journal of Physics A-Mathematical and Theoretical* 2012; **45**(32) : 325002-1-23.
- REIMANN P, KASTNER M.** Equilibration of isolated macroscopic quantum systems. *New Journal of Physics* 2012; **14**(4) : 043020 (1-17).
- REINHARDT H, WEIGEL H.** Vacuum nature of the QCD condensates. *Physical Review D* 2012; **85** : 074029 (1-5).
- SHEIKHAN A, MAASS P, RAHIMI TABAR MR.** Coherent backscattering of electromagnetic waves in random media. *EPL* 2012; **98**(1) : 14005-1-5.
- SHEIKHAN A, SNYMAN I.** Fermi edge singularity and finite-frequency spectral features in a semi-infinite one-dimensional wire. *Physical Review B* 2012; **86** : 085122-1-11.
- SINHA D, CHAKRABORTY B, SCHOLTZ FG.** Non-commutative quantum mechanics in three dimensions and rotational symmetry. *Journal of Physics A-Mathematical and Theoretical* 2012; **45**(10) : 105308-1-24.
- SNYMAN I, NAZAROV YV.** Polarons in Suspended Carbon Nanotubes. *Physical Review Letters* 2012; **108**(7) : 076805-1-4.
- TKALYA EV, AVDEENKOV AV, BIBIKOV AV, BODRENKO IV, NIKOLAEV AV.** Electron capture Beta decay of ^7Be located inside and outside the C_{36} fullerene. *Physical Review C* 2012; **86** : 014608-1-7.
- WEIGEL H, QUANDT M, GRAHAM N.** Cosmic Strings Stabilized by Fermion Fluctuations. *International Journal of Modern Physics A* 2012; **27**(15) : 1260016 (1-16).
- ZHANG F, BRINK J, SZILAGYI B, LOVELACE G.** Geometrically motivated coordinate system for exploring spacetime dynamics in numerical-relativity simulations using a quasi-Kinnersley tetrad. *Physical Review D* 2012; **86** : 084020-1-30.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

WEIGEL H. The Search for the Higgs Particle. *Physics Comment - A Southern African Physics Magazine* 2012; **4**(4) : 10-14.

- BOTHA M, BOTES M, LOOS B, SMITH C, DICKS LMT.** *Lactobacillus equigenosus* strain Le1 invades equine epithelial cells. *Applied and Environmental Microbiology* 2012; **78**(12) : 4248-4255.
- BSHENA O, HEUNIS TDJ, DICKS LMT, KLUMPERMAN B.** Antimicrobial fibres: therapeutic possibilities and recent advances. *Future Medicinal Chemistry* 2011; **3**(14) : 1823-1849.
- CHIKERE CB, SURRIDGE K, OKPOKWASILI GC, CLOETE TE.** Dynamics of indigenous bacterial communities associated with crude oil degradation in soil microcosms during nutrient-enhanced bioremediation. *Waste Management & Research* 2012; **30**(3) : 225-236.
- CHIMPHANGO AFA, ROSE SH, VAN ZYL WH, GÖRGENS JF.** Production and characterisation of recombinant α -L-arabinofuranosidase for production of xylan hydrogels. *Applied Microbiology and Biotechnology* 2012; **95** : 101-112.
- CHIMPHANGO AFA, VAN ZYL WH, GÖRGENS JF.** In situ enzymatic aided formation of xylan hydrogels and encapsulation of horse radish peroxidase for slow release. *Carbohydrate Polymers* 2012; **88** : 1109-1117.
- CHIMPHANGO AFA, VAN ZYL WH, GÖRGENS JF.** Isolation, characterization and enzymatic modification of water soluble xylans from *Eucalyptus grandis* wood and sugarcane bagasse. *Journal of Chemical Technology and Biotechnology* 2012; **87** : 1419-1429.
- DU PLESSIS DM, BOTES M, DICKS LMT, CLOETE TE.** Immobilization of commercial hydrolytic enzymes on poly (acrylonitrile) nanofibers for anti-biofilm activity. *Journal of Chemical Technology and Biotechnology* 2012; **88** (4) : 585-593. DOI 10.1002/jctb.3866.
- DU PLESSIS L, BOTES M, DICKS LMT, CLOETE TE.** Antimikrobiese nanovesels vir waterbehandeling: poli(vinielalkohol)- en poli(akrielonitriël)-nanovesels met silwer-nanopartikels. *Litnet Akademies* 2012; **9**(2) : 25-41.
- ENDO A, ENDO Y, SCHUMANN P, PUKALL R, DICKS LMT.** *Bifidobacterium reuteri* sp. nov., *Bifidobacterium callitrichos* sp. nov., *Bifidobacterium saguini* sp. nov., *Bifidobacterium stellenboschense* sp. nov. and *Bifidobacterium biavatii* sp. nov. isolated from faeces of common marmoset (*Callithrix jacchus*) and red-handed tamarin (*Saguinus midas*). *Systematic and Applied Microbiology* 2012; **35** : 92-97.
- ENDO A, IRISAWA T, FUTAGAWA-ENDO Y, TAKANO K, DU TOIT M, OKADA S, DICKS LMT.** Characterization and emended description of *Lactobacillus kunkeei* as a fructophilic lactic acid bacterium. *International Journal of Systematic and Evolutionary Microbiology* 2012; **62**(3) : 500-504.
- FAVARO L, JOOSTE T, BASAGLIA M, ROSE SH, SAAYMAN M, GÖRGENS JF, CASELLA S, VAN ZYL WH.** Codon-optimized glucoamylase sGal of *Aspergillus awamori* improves starch utilization in an industrial yeast. *Applied Microbiology and Biotechnology* 2012; **95** : 957-968.
- GULE NP, BSHENA OESS, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B.** Immobilized furanone derivatives as inhibitors for adhesion of bacteria on modified poly(styrene-co-maleic anhydride). *Biomacromolecules* 2012; **13** : 3138-3150.
- GULE NP, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B.** Electrospun poly(vinyl alcohol) nanofibres with biocidal additives for application in filter media, 1 Properties affecting fibre morphology and characterisation. *Macromolecular Materials and Engineering* 2012; **297** : 609-617.
- GULE NP, DE KWAADSTENIET M, CLOETE TE, KLUMPERMAN B.** Electrospun poly(vinyl alcohol) nanofibres with biocidal additives for application in filter media, 2 Antimicrobial activity, regeneration, leaching and water stability. *Macromolecular Materials and Engineering* 2012; **297** : 618-626.
- JAMES ER, VAN ZYL WH, VAN ZYL PJ, GÖRGENS JF.** Recombinant hepatitis B surface antigen production in *Aspergillus niger*: evaluating the strategy of gene fusion to native glucoamylase. *Applied Microbiology and Biotechnology* 2012; **96** : 385-394.
- LOFTIE-EATON W, RAWLINGS DE.** Diversity, biology and evolution of IncQ-family plasmids. *Plasmid* 2012; **67** : 15-34.
- MOUTON M, POSTMA F, WILSENACH J, BOTHA A.** Diversity and characterization of culturable fungi from marine sediment collected from St. Helena Bay, South Africa. *Microbial Ecology* 2012; **64** : 311-319.
- NEVELING DP, ENDO A, DICKS LMT.** Fructophilic *Lactobacillus kunkeei* and *Lactobacillus brevis* Isolated from Fresh Flowers, Bees and Bee-hives. *Current Microbiology* 2012; **65**(5) : 507-515.
- NGUEMA-ONA E, MOORE JP, FAGERSTROM A, FANGEL JU,**

WILLATS WGT, HUGO A, VIVIER MA. Profiling the main cell wall polysaccharides of tobacco leaves using high-throughput and fractionation techniques. *Carbohydrate Polymers* 2012; **88**(3) : 939-949.

NJOKWENI A, ROSE SH, VAN ZYL WH. Fungal α -glucosidase expression in *Saccharomyces cerevisiae*. *Journal of Industrial Microbiology & Biotechnology* 2012; **39** : 1445-1452.

PAULSE AN, JACKSON VA, KHAN W, KHAN S. Isolation and identification of bacterial pollutants from the Berg and Plankenburg Rivers in the Western Cape, South Africa. *Water SA* 2012; **38**(5) : 819-824.

SMITH JJ, BURKE A, BREDELL H, VAN ZYL WH, GÖRGENS JF. Comparing cytosolic expression to peroxisomal targeting of the chimeric L1/L2 (*ChiΔH-L2*) gene from human papillomavirus type 16 in the methylotrophic yeasts *Pichia pastoris* and *Hansenula Polymorpha*. *Yeast* 2012; **29** : 385-393.

STONE W, JONES BL, WILSENACH J, BOTHA A. External ecological niche for *Candida albicans* within reducing, oxygen-limited zones of wetlands. *Applied and Environmental Microbiology* 2012; **78** : 2443-2445.

TIAN KM, CHEN XZ, SHEN W, PRIOR BA, SHI GY, SINGH S, WANG Z-X. High-efficiency conversion of glycerol to D-lactic acid with metabolically engineered *Escherichia coli*. *African Journal of Biotechnology* 2012; **11**(21) : 4860-4867.

VAN RENSBURG E, DEN HAAN R, SMITH JJ, VAN ZYL WH, GÖRGENS JF. The metabolic burden of cellulase expression by recombinant *Saccharomyces cerevisiae* Y294 in aerobic batch culture. *Applied Microbiology and Biotechnology* 2012; **96** : 197-209.

VAN STADEN ADP, BRAND A, DICKS LMT. Nisin F-loaded brushite bone cement prevented the growth of *Staphylococcus aureus* in vivo. *Journal of Applied Microbiology* 2012; **112** : 831-840.

VAN STADEN ADP, DICKS LMT. Calcium orthophosphate-based bone cements (CPCs): Applications, antibiotic release and alternatives to antibiotics. *Journal of Applied Biomaterials & Biomechanics* 2012; Vol 1(10):2-11. DOI: 10.5301/JABB.2012.9130.

VAN ZYL WH, BLOOM M, VIKTOR M. Engineering yeasts for raw starch conversion. *Applied Microbiology and Biotechnology* 2012; **95**(6) : 1377-1388.

VISAGIE CM, JACOBS K. Three new additions to the genus *Talaromyces* isolated from Atlantis sandveld fynbos soils. *Persoonia* 2012; **28** : 14-24.

ZHOU L, NIU DD, TIAN KM, CHEN XZ, PRIOR BA, SHEN W, SHI GY, SINGH S, WANG Z-X. Genetically switched D-lactate production in *Escherichia coli*. *Metabolic Engineering* 2012; **14** : 560-568.

ZHOU L, SHEN W, NIU DD, TIAN KM, PRIOR BA, SHI GY, SINGH S, WANG Z-X. Fine tuning the transcription of *ldhA* for D-lactate production. *Journal of Industrial Microbiology & Biotechnology* 2012; **39** : 1209-1217.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

MARAIS A, HARDY M, BOOYSE M, BOTHA A. Effects of monoculture, crop rotation, and soil moisture content on selected soil physicochemical and microbial parameters in wheat fields. *Applied and Environmental Soil Science* 2012 (2012). Doi:10.1155/2012/593623.

Doktoraal Afgehandel/Doctoral completed

SLABBERT E. *Microbial communities of riparian ecotone invaded by non-indigenous Acacias*. PhD, 2012. 232 pp. Supervisor: Jacobs K. Cosupervisor: Jacobs SM.

VISAGIE CM. *The polyphasic taxonomy of Penicillium and Talaromyces spp. isolated from the diverse Fynbos*. PhD, 2012. 344 pp. Supervisor: Jacobs K. Cosupervisor: Roets F.

Plant- en Dierkunde | Botany and Zoology

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

AL NADAF S, DEAKIN JE, GILBERT C, ROBINSON TJ, GRAVES JAM, WATERS PD. A cross-species comparison of escape from X inactivation in Eutheria: implications for evolution of X chromosome inactivation. *Chromosoma* 2012; **121** : 71-78.

ALBRECHT CF, STANDER MA, GROBBELAAR MC, COLLING J, KOSSMANN J, HILLS PN, MAKUNGA NP. LC-MS-based metabolomics assists with quality assessment and traceability of wild and

cultivated plants of *Sutherlandia frutescens* (Fabaceae). *South African Journal of Botany* 2012; **82** : 33-45.

ALLEN JL, CLUSELLA-TRULLAS S, CHOWN SL. The effects of acclimation and rates of temperature change on critical thermal limits in *Tenebrio molitor* (Tenebrionidae) and *Cyrtobagous salviniae* (Curculionidae). *Journal of Insect Physiology* 2012; **58** : 669-678.

ANDERSON BC, KAWAKITA A, TAYASU I. Sticky plant captures prey for symbiotic bug: is this digestive mutualism?. *Plant Biology* 2012; **14** : 888-893.

BADENHORST D, DOBIGNY G, ROBINSON TJ. Karyotypic Evolution of *Hapalomys* Inferred from Chromosome Painting: A Detailed Characterization Contributing New Insights into the Ancestral Murinae Karyotype. *Cytogenetic and Genome Research* 2012; **136** : 83-88.

BADENHORST D, TATARD C, SUPUTTAMONGKOL Y, ROBINSON TJ, DOBIGNY G. Host cell/*Orientia tsutsugamushi* interactions: Evolution and expression of syndecan-4 in Asian rodents (Rodentia, Muridae). *Infection Genetics and Evolution* 2012; **12** : 1136-1146.

BAIRD D, ASMUS H, ASMUS R. Effect of invasive species on the structure and function of the Sylt-Rømø Bight ecosystem, northern Wadden Sea, over three time periods. *Marine Ecology-Progress Series* 2012; **462** : 143-162.

BAIRD D. Assessment of observed and perceived changes in ecosystems over time, with special reference to the Sylt-Rømø Bight, German Wadden Sea. *Estuarine Coastal and Shelf Science* 2012; **108** : 144-154.

BAUER R, BASSON CE, BEKKER J, EDUARDO I, ROHWER JM, UYS L, VAN WYK JH, KOSSMANN J. Reuteran and levan as carbohydrate sinks in transgenic sugarcane. *Planta* 2012; **236** : 1803-1815.

BEEKMAN M, ALLSOPP MH, HOLMES MJ, LIM J, NOACH-PIENAAR L, WOSSLER TC, OLDROYD BP. Racial mixing in South African honeybees: the effects of genotype mixing on reproductive traits of workers. *Behavioral Ecology and Sociobiology* 2012; **66** : 897-904.

BENGTSSON J, JANION C, CHOWN SL, LEINAAS HP. Litter decomposition in fynbos vegetation, South Africa. *Soil Biology & Biochemistry* 2012; **47** : 100-105.

BERTHOULY-SALAZAR C, CASSEY P, JANSEN VAN VUUREN B, JANSE VAN RENSBURG B, HUI C, GARDNER MG, LE ROUX JJ. Development and characterization of 13 new, and cross amplification of 3, polymorphic nuclear microsatellite loci in the common myna (*Acridotheres tristis*). *Conservation Genetics Resources* 2012; **4** : 621-624.

BERTHOULY-SALAZAR C, VAN RENSBURG BJ, LE ROUX JJ, JANSEN VAN VUUREN B, HUI C. Spatial Sorting Drives Morphological Variation in the Invasive Bird, *Acridotheres tristis*. *PLoS ONE* 2012; **7** : e38145.

BLOMEFIELD TL, GILIOME JH. Availability and location of cocooning sites for diapausing codling moth larvae (*Cydia pomonella* (L.)) (Lepidoptera: Tortricidae) on mature and young apple trees. *African Entomology* 2012; **20** : 182-186.

BLOMEFIELD TL, GILIOME JH. Fecundity and mortality of codling moth, *Cydia pomonella* (L.) (Lepidoptera: Tortricidae), under field conditions in South Africa. *African Entomology* 2012; **20** : 316-324.

BOARDMAN L, TERBLANCHE JS, HETZ SK, MARAIS E, CHOWN SL. Reactive oxygen species production and discontinuous gas exchange in insects. *Proceedings of the Royal Society B-Biological Sciences* 2012; **279** : 893-901.

BORN C, LE ROUX PC, SPOHR C, MC GEOCH MA, JANSEN VAN VUUREN B. Plant dispersal in the sub-Antarctic inferred from anisotropic genetic structure. *Molecular Ecology* 2012; **21** : 184-194.

BRASCHLER B, CHOWN SL, GASTON KJ. The Fynbos and Succulent Karoo Biomes do not have exceptional local ant richness. *PLoS ONE* 2012; **7** : e31463.

BRITTON-DAVIDIAN J, ROBINSON TJ, VEYRUNES F. Systematics and evolution of the African pygmy mice, subgenus *Nannomys*: A review. *Acta Oecologica-International Journal of Ecology* 2012; **42** : 41-49.

BURCKHARDT D, DROHOJOWSKA J, GILIOME JH. Trioza bullatae sp. n. (Hemiptera: Psylloidea), a new gall-inducing pest on black stinkwood (*Ocotea bullata*, Lauraceae) in South Africa. *African Entomology* 2012; **20** : 144-149.

CAMPANA MG, ROBINSON TJ, CAMPOS PF, TUROSS N. Independent confirmation of a diagnostic sheep/goat peptide sequence through DNA analysis and further exploration of its taxonomic utility within the Bovidae. *Journal of Archaeological Science* 2012; **40** : 1421-1424.

CATFORD JA, VESK P, RICHARDSON DM, PYŠEK P. Quantifying levels of biological invasion: towards the objective classification of invaded and invulnerable ecosystems. *Global Change Biology* 2012; **18** : 44-62.

CHOWN SL, HUISKES AHL, GREMMEN NJM, LEE JE, TERAUDS A, CROSBIE K, FRENOT Y, HUGHES KA, IMURA

- S, KIEFER K, LÉBOUVIER M, RAYMOND B, TSUJIMOTO M, WARE C, VAN DE VIJVER B, BERGSTROM DM.** Continent-wide risk assessment for the establishment of nonindigenous species in Antarctica. *Proceedings of the National Academy of Sciences of the United States of America* 2012; **109** : 4938-4943.
- CHOWN SL, LEE JE, HUGHES KA, BARNES J, BARRETT PJ, BERGSTROM DM, CONVEY P, COWAN DA, CROSBIE K, DYER G, FRENOT Y, GRANT SM, HERR D, KENNICUTT MC, LAMERS M, MURRAY A, POSSINGHAM HP, REID K, RIDDLE MJ, RYAN PG, SANSON L, SHAW JD, SPARROW MD, SUMMERHAYES C.** Challenges to the Future Conservation of the Antarctic. *Science* 2012; **337** : 158-159.
- CHOWN SL.** Antarctic Marine Biodiversity and Deep-Sea Hydrothermal Vents. *Plos Biology* 2012; **10** : e1001232.
- CHOWN SL.** Trait-based approaches to conservation physiology: forecasting environmental change risks from the bottom up. *Philosophical Transactions of the Royal Society B-Biological Sciences* 2012; **367** : 1615-1627.
- CONRADIE W, BRANCH WR, MEASEY GJ, TOLLEY KA.** A new species of *Hyperolius* Rapp, 1842 (Anura: Hyperoliidae) from the Serra da Chela mountains, south-western Angola. *Zootaxa* 2012; **3269** : 1-17.
- CONRADIE W, MEASEY GJ, BRANCH WR, TOLLEY KA.** Revised phylogeny of African sand lizards (*Pedioplanis*), with the description of two new species from south-western Angola. *African Journal of Herpetology* 2012; **iFirst** : 1-22.
- CORNILLE A, UNDERHILL JG, CRUAUD A, HOSSAERT-MCKEY M, JOHNSON SD, TOLLEY KA, KJELLBERG F, VAN NOORT S, PROFFIT M.** Floral volatiles, pollinator sharing and diversification in the fig-wasp mutualism: insights from *Ficus natalensis*, and its two wasp pollinators (South Africa). *Proceedings of the Royal Society B-Biological Sciences* 2012; **279** : 1731-1739.
- CROUS PW, SUMMERELL BA, SHIVAS RG, BURGESS TI, DECOCK CA, DREYER LL, GRANKE L, GUEST DI, HARDY GE STJ, HAUSBECK MK, HÜBERLI D, JUNG T, KOUKOL O, LENNOX CL, LIEW ECY, LOMBARD L, MCTAGGART AR, PRYKE JS, ROETS F, SAUDE C, ET AL.** Fungal Planet description sheets: 107-127. *Persoonia* 2012; **28** : 138-182.
- CURRAN HR, DREYER LL, ROETS F.** Impact of disease frequency and host density on pollination and transmission of an African anther-smut fungus. *Planta* 2012; **236**(6) : 1677-1685.
- DANIELS SR, BAYLISS J.** Neglected refugia of biodiversity: mountainous regions in Mozambique and Malawi yield two novel freshwater crab species (Potamonautidae: Potamonautes). *Zoological Journal of the Linnean Society* 2012; **164** : 498-509.
- DE JAGER ML, ELLIS AG.** Gender-specific pollinator preference for flora traits. *Functional Ecology* 2012; **26** : 1197-1204.
- DE LUNA CJ, GOODMAN SJ, THATCHER O, JEPSON PD, ANDERSEN L, TOLLEY KA, HOELZEL AR.** Phenotypic and genetic divergence among harbour porpoise populations associated with habitat regions in the North Sea and adjacent seas. *Journal of Evolutionary Biology* 2012; **25** : 674-681.
- DE WAAL C, ANDERSON BC, BARRETT SCH.** The natural history of pollination and mating in bird-pollinated *Babiana* (Iridaceae). *Annals of Botany* 2012; **109** : 667-679.
- DE WAAL C, BARRETT SCH, ANDERSON BC.** The effect of mammalian herbivory on inflorescence architecture in Ornithophilous *Babiana* (Iridaceae): implications for the evolution of a bird perch. *American Journal of Botany* 2012; **99** : 1096-1103.
- DU PLESSIS IJ, MOUTON PLN.** Foraging strategies of coexisting lacertid lizards in the arid Tankwa Karoo Basin of South Africa. *African Zoology* 2012; **47** : 113-118.
- DU TOIT N, JANSEN VAN VUUREN B, MATTHEE S, MATTHEE CA.** Biome specificity of distinct genetic lineages within the four-striped mouse *Rhabdomys pumilio* (Rodentia: Muridae) from southern Africa with implications for taxonomy. *Molecular Phylogenetics and Evolution* 2012; **65** : 75-86.
- EDWARDS S, VANHOODYDONCK B, HERREL A, MEASEY GJ, TOLLEY KA.** Convergent Evolution Associated with Habitat Decouples Phenotype from Phylogeny in a Clade of Lizards. *PLoS ONE* 2012; **7** : e51636.
- ELLIS AG, JOHNSON SD.** Lack of floral constancy by bee fly pollinators: implications for ethological isolation in an African daisy. *Behavioral Ecology* 2012; **19** : 729-734.
- ENTLING MH, SCHWEIGER O, BACHER S, ESPADALER X, HICKLER T, KUMSCHICK S, WOODCOCK BA, NENTWIG W.** Species Richness-Environment Relationships of European Arthropods at Two Spatial Grains: Habitats and Countries. *PLoS ONE* 2012; **7** : e45875.
- FAWOLE OA, MAKUNGA NP, OPARA UL.** Antibacterial, antioxidant and tyrosinase-inhibition activities of pomegranate fruit peel methanolic extract. *BMC Complementary and Alternative Medicine* 2012; **12** : 200-211.
- FELDHEIM KA, DA SILVA JM, TOLLEY KA.** Isolation of novel microsatellite loci in dwarf chameleons from KwaZulu-Natal province, South Africa and their cross-amplification in other *Bradypodion* species. *Conservation Genetics Resources* 2012; **4** : 205-211.
- FOURIE CE, VAN NIEKERK A, MUCINA L.** Semi-automated segment generation for geographic novelty detection using edge and area metrics. *South African Journal of Geomatics* 2012; **1**(2) : 133-148.
- GAERTNER M, NOTTEBROCK H, FOURIE H, PRIVETT SDJ, RICHARDSON DM.** Plant invasions, restoration, and economics: Perspectives from South African fynbos. *Perspectives in Plant Ecology Evolution and Systematics* 2012; **14** : 341-353.
- GEERTS S, MALHERBE SDT, PAUW A.** Reduced flower visitation by nectar-feeding birds in response to fire in Cape fynbos vegetation, South Africa. *Journal of Ornithology* 2012; **153** : 297-301.
- GEERTS S, PAUW A.** The cost of being specialized: Pollinator limitation in the endangered geophyte *Brunsvigia litoralis* (Amaryllidaceae) in the Cape Floristic Region of South Africa. *South African Journal of Botany* 2012; **78** : 159-164.
- GIBSON MR, RICHARDSON DM, PAUW A.** Can floral traits predict an invasive plant's impact on native plant-pollinator communities?. *Journal of Ecology* 2012; **100** : 1216-1223.
- GREENBAUM E, TOLLEY KA, JOMA A, KUSAMBA C.** A new species of chameleon (Sauria: Chamaeleonidae: *Kinyongia*) from the Northern Albertine Rift, Central Africa. *Herpetologica* 2012; **68** : 60-75.
- GROENEVELD JC, VON DER HEYDEN S, MATTHEE CA.** High connectivity and lack of mtDNA differentiation among two previously recognized spiny lobster species in the southern Atlantic and Indian Oceans. *Marine Biology Research* 2012; **8** : 764-770.
- GROENEWALD B, HETZ SK, CHOWN SL, TERBLANCHE JS.** Respiratory dynamics of discontinuous gas exchange in the tracheal system of the desert locust, *Schistocerca gregaria*. *Journal of Experimental Biology* 2012; **215** : 2301-2307.
- HARDESTY BD, LE ROUX JJ, ROCHA OJ, MEYER J, WESTCOTT DA, WIECZOREK AM.** Getting here from there: testing the genetic paradigm underpinning introduction histories and invasion success. *Diversity and Distributions* 2012; **18** : 147-157.
- HASSANIN A, DELSUC F, ROPIQUET A, HAMMER C, JANSEN VAN VUUREN B, MATTHEE CA, RUIZ-GARCIA M, CATZEFLIS F, ARESKOUG V, NGUYEN TT, COULOUX A.** Pattern and timing of diversification of Cetartiodactyla (Mammalia, Laurasiatheria), as revealed by a comprehensive analysis of mitochondrial genomes. *Comptes Rendus Biologies* 2012; **335** : 32-50.
- HERREL A, MEASEY GJ, VANHOODYDONCK B, TOLLEY KA.** Got It Clipped? The Effect of Tail Clipping on Tail Gripping Performance in Chameleons. *Journal of Herpetology* 2012; **46** : 91-93.
- HOLLEMAN W, VON DER HEYDEN S, ZSILAVECZ G.** Delineating the fishes of the *Clinus superciliosus* species complex in southern African waters (Blennioidei: Clinidae: Clinini), with the validation of *Clinus arborescens* Gilchrist & Thompson, 1908 and *Clinus ornatus* Gilchrist & Thompson, 1908, and with descriptions of two new species. *Zoological Journal of the Linnean Society* 2012; **166** : 827-853.
- HORAK IG, LUTERMANN H, MEDGER K, APANASKEVICH A, MATTHEE CA.** Natural hosts of the larvae of *Nuttalliella* sp. (*N. namaqua*?) (Acari: Nuttalliellidae). *Onderstepoort Journal of Veterinary Research* 2012; **79** : Art. #405.
- HUI C, BOONZAAIER C, BOYERO L.** Estimating changes in species abundance from occupancy and aggregation. *Basic and Applied Ecology* 2012; **13** : 169-177.
- HUI C, ROURA-PASCUAL N, BROTONS L, ROBINSON RA, EVANS KL.** Flexible dispersal strategies in native and non-native ranges: environmental quality and the 'good-stay, bad-disperse' rule. *Ecography* 2012; **35** : 1024-1032.
- HUI C.** Scale effect and bimodality in the frequency distribution of species occupancy. *Community Ecology* 2012; **13** : 30-35.
- JANION C, D'HAESE CA, DEHARVENG L.** A new species and first record of the genus *Triacanthella* Schäffer, 1897 (Collembola, Poduromorpha, Hypogastruridae) for Africa. *ZooKeys* 2012; **163** : 57-68.
- JANSEN VAN VUUREN B, WOOLAVER L, GOODMAN S.** Genetic population structure in the boky-boky (Carnivora: Eupleridae), a conservation flagship species in the dry deciduous forests of central western Madagascar. *Animal Conservation* 2012; **15** : 164-173.

- JOHNSON SD, NEWMAN E, ANDERSON BC.** Preliminary observations of insect pollination in *Protea punctata* (Proteaceae). *South African Journal of Botany* 2012; **83** : 63-67.
- JOHNSON T, GILIOOME JH.** Seasonal phenology and natural enemies of the oleander mealybug, *Paracoccus burnerae* (Brain) (Hemiptera: Pseudococcidae), in South Africa. *African Entomology* 2012; **20** : 1-7.
- JORDAAN M, REINECKE SA, REINECKE AJ.** Acute and sublethal effects of sequential exposure to the pesticide azinphos-methyl on juvenile earthworms (*Eisenia andrei*). *Ecotoxicology* 2012; **21** : 649-661.
- JÜRGENS N, SCHMIEDEL U, HAARMEYER DH, DENGLER J, FINCKH M, GOETZE D, GRÖNGRÖFT A, HAHN K, KOULIBALY A, LUTHER-MOSEBACH J, MUCHE G, OLDELAND J, PETERSEN A, POREMBSKI S, RUTHERFORD MC, SCHMIDT M, SINSIN B, STROHBACH BJ, THIOMBIANO A, WITTIG R, ZIZKA G.** The BIOTA Biodiversity Observatories in Africa—a standardized framework for large-scale environmental monitoring. *Environmental Monitoring and Assessment* 2012; **184** : 655-678.
- KAPLAN H, VAN ZYL HWF, LE ROUX JJ, RICHARDSON DM, WILSON JRU.** Distribution and management of *Acacia implexa* (Benth.) in South Africa: A suitable target for eradication?. *South African Journal of Botany* 2012; **83** : 23-35.
- LEE JE, SOMERS MJ, CHOWN SL.** Density, body size and sex ratio of an indigenous spider along an altitudinal gradient in the sub-Antarctic. *Antarctic Science* 2012; **24** : 15-22.
- LEUNG B, ROURA-PASCUAL N, BACHER S, HEIKKILÄ J, BROTONS L, BURGMAN M, DEHNEN-SCHMUTZ K, ESSL F, HULME PE, RICHARDSON DM, SOL D, VILÀ M.** Teasing apart alien species risk assessments: a framework for best practices. *Ecology Letters* 2012; **15** : 1475-1493.
- LUI WPA, JANION C, CHOWN SL.** Collembola diversity in the critically endangered Cape Flats Sand Fynbos and adjacent pine plantations. *Pedobiologia* 2012; **55** : 203-209.
- LYONS CL, COETZEE M, TERBLANCHE JS, CHOWN SL.** Thermal limits of wild and laboratory strains of two African malaria vector species, *Anopheles arabiensis* and *Anopheles funestus*. *Malaria Journal* 2012; **11** : 226-240.
- MAGER DM, HUI C.** A first record of biological soil crusts in the Cape Floristic Region. Art. #1013. *South African Journal of Science* 2012; **108** : 80-83.
- MAGOBA RNN, SAMWAYS MJ.** Comparative footprint of alien, agricultural and restored vegetation on surface-active arthropods. *Biological Invasions* 2012; **14** : 165-177.
- MCDONALD DE, DANIELS SR.** Phylogeography of the Cape velvet worm (*Onychophora: Peripatopsis capensis*) reveals the impact of Pliocene/Pleistocene climatic oscillations on Afromontane forest in the Western Cape, South Africa. *Journal of Evolutionary Biology* 2012; **25** : 824-835.
- MCDONALD DE, RUHBERG H, DANIELS SR.** Two new *Peripatopsis* species (*Onychophora: Peripatopsidae*) from the Western Cape province, South Africa. *Zootaxa* 2012; **3380** : 55-68.
- MCGEACH MA, SPEAR D, KLEYNHANS EJ, MARAIS E.** Uncertainty in invasive alien species listing. *Ecological Applications* 2012; **22** : 959-971.
- MCLEISH MJ, BEUKMAN G, VAN NOORT S, WOSSLER TC.** Host-Plant Species Conservatism and Ecology of a Parasitoid Fig Wasp Genus (*Chalcidoidea; Sycoryctinae; Arachonia*). *PLoS ONE* 2012; **7** : e44804.
- MCLEISH MJ, VAN NOORT S.** Codivergence and multiple host species use by fig wasp populations of the *Ficus* pollination mutualism. *BMC Evolutionary Biology* 2012; **12** : 1-12.
- MILLER BJ, VON DER HEYDEN S, GIBBONS MJ.** Significant population genetic structuring of the holoplanktic scyphozoan *Pelagia noctiluca* in the Atlantic Ocean. *African Journal of Marine Science* 2012; **34** : 425-430.
- MONTGELARD C, MATTHEE CA.** Tempo of genetic diversification in southern African rodents: The Role of Plio-Pleistocene climatic oscillations as drivers for speciation. *Acta Oecologica-International Journal of Ecology* 2012; **42** : 50-57.
- MORTIMER E, JANSEN VAN VUUREN B, MEIKLEJOHN KI, CHOWN SL.** Phylogeography of a mite, *Halozetes fulvus*, reflects the landscape history of a young volcanic island in the sub-Antarctic. *Biological Journal of the Linnean Society* 2012; **105** : 131-145.
- MORTIMER PE, LE ROUX M, PÉREZ-FERNÁNDEZ MA, BENEDITO VA, KLEINERT A, XU J, VALENTINE AJ.** The dual symbiosis between arbuscular mycorrhiza and nitrogen fixing bacteria benefits the growth and nutrition of the woody invasive legume *Acacia cyclops* under nutrient limiting conditions. *Plant and Soil* 2012; **363** : 1-13.
- MORTIMER PE, PÉREZ-FERNÁNDEZ MA, VALENTINE AJ.** Arbuscular mycorrhiza maintains nodule function during external NH_4^+ supply in *Phaseolus vulgaris* (L.). *Mycorrhiza* 2012; **22** : 237-245.
- MOUTON PLN, FLEMMING AF, STANLEY E.** Synchronized versus asynchronized breeding in cordylid lizards: an evolutionary perspective. *Journal of Zoology* 2012; **288** : 191-198.
- MULLER CM, VON DER HEYDEN S, BOWIE RCK, MATTHEE CA.** Oceanic circulation, local upwelling and palaeoclimatic changes linked to the phylogeography of the Cape sea urchin *Parechinus angulosus*. *Marine Ecology-Progress Series* 2012; **468** : 203-215.
- MUSARURWA HT, KOEGELENBERG L, MAKUNGA NP.** Chemical variation in essential oil profiles detected using headspace solid-phase microextraction Gas Chromatography Spectrometry in response to Potassium, Nitrogen, and Water available to micropropagated plants of *Salvia stenophylla* (Burch. ex Benth.). *Journal of Plant Growth Regulation* 2012; **31** : 207-220.
- NEWMAN E, ANDERSON BC, JOHNSON SD.** Flower colour adaptation in a mimetic orchid. *Proceedings of the Royal Society B-Biological Sciences* 2012; **279** : 2309-2312.
- NIQUIL N, CHAUMILLON E, JOHNSON GA, BERTIN X, GRAMI B, DAVID V, BACHER C, ASMUS H, BAIRD D, ASMUS R.** The effect of physical drivers on ecosystem indices derived from ecological network analysis: Comparison across estuarine ecosystems. *Estuarine Coastal and Shelf Science* 2012; **108** : 132-143.
- OBERLANDER KC, ROETS F, DREYER LL.** Chloroplast phylogeography of threatened aquatic *Oxalis* (*Oxalidaceae*): significant inter-population structure, divergent haplotypes and conservation implications. *Conservation Genetics* 2012; **13**(3) : 789-799.
- PIETERSE A, PITCHER G, NAIDOO P, JACKSON S.** Growth and condition of the Pacific Oyster *Crassostrea gigas* at three environmentally distinct South African Oyster farms. *Journal of Shellfish Research* 2012; **31** : 1-16.
- PORCO D, BEDOS A, GREENSLADE P, JANION C, SKARZYNSKI D, STEVENS MI, JANSEN VAN VUUREN B, DEHARVENG L.** Challenging species delimitation in Collembola: cryptic diversity among common springtails unveiled by DNA barcoding. *Invertebrate Systematics* 2012; **26** : 470-477.
- PROCHES S, WILSON JRU, RICHARDSON DM, REJMÁNEK M.** Native and naturalized range size in *Pinus*: relative importance of biogeography, introduction effort and species traits. *Global Ecology and Biogeography* 2012; **21** : 513-523.
- REINECKE AJ, MDZEKE NP, REINECKE SA.** Spatial and temporal variation in cadmium body loads of four intertidal invertebrates from False Bay, South Africa. *African Zoology* 2012; **47** : 12-25.
- RICHARDSON DM, PYŠEK P.** Naturalization of introduced plants: ecological drivers of biogeographical patterns. *New Phytologist* 2012; **196** : 383-396.
- RICHARDSON DM.** Conservation biogeography: what's hot and what's not?. *Diversity and Distributions* 2012; **18** : 319-322.
- RIDLEY AR, VAN DEN HEUVEL IM.** Is there a difference in reproductive performance between cooperative and non-cooperative species? A southern African comparison. *Behaviour* 2012; **149** : 821-848.
- ROBINSON TJ, YANG F.** Molecular cytogenetics: karyotype evolution, phylogenomics and future prospects. *Heredity* 2012; **108** : 1-3.
- ROETS F, CURRAN P, DREYER LL.** Morphological and reproductive consequences of an anther smut fungus on *Oxalis*. *Sydowia* 2012; **46**(2) : 267-280.
- ROETS F, THERON N, WINGFIELD MJ, DREYER LL.** Biotic and abiotic constraints that facilitate host exclusivity of Gondwanamycetes and *Ophiostoma* on *Protea*. *Fungal Biology* 2012; **116**(1) : 49-61.
- ROSS JL, IVANOVA ES, SIRGEL WF, MALAN AP, WILSON MJ.** Diversity and distribution of nematodes associated with terrestrial slugs in the Western Cape Province of South Africa. *Journal of Helminthology* 2012; **86** : 215-221.
- RUIZ-HERRERA A, FARRÉ M, ROBINSON TJ.** Molecular cytogenetic and genomic insights into chromosomal evolution. *Heredity* 2012; **108** : 28-36.
- RUTHERFORD MC, MUCINA L, POWRIE LW.** The South African National Vegetation Database: History, development, applications, problems and future. *South African Journal of Science* 2012; **108** (1/2) : Art. #629.
- RUTHERFORD MC, POWRIE LW, HUSTED LB.** Plant diversity consequences of a herbivore-driven biome switch from Grassland to Nama-Karoo shrub steppe in South Africa. *Applied Vegetation Science* 2012; **15** : 14-25.
- RUTHERFORD MC, POWRIE LW, THOMPSON DI.** Impacts of high utilisation pressure on biodiversity components in *Colophospermum mopane* savanna. *African Journal of Range & Forage Science* 2012; **29** : 1-11.
- RUWANZA S, MUSIL CF, ESLER KJ.** Sucrose application is ineffectual as a restoration aid in a transformed southern African lowland fynbos ecosystem. *South African Journal of Botany* 2012; **80** : 1-8.
- SCHWARTZ MW, HELLMANN JJ, MCLACHLAN JS, SAX DF, BOREVITZ JO, BRENNAN J, CAMACHO AE, CEBALLOS**

G, CLARK JR, DOREMUS H, RICHARDSON DM, VELLEND M, VITT P, ZELLMER S. Managed Relocation: Integrating the Scientific, Regulatory, and Ethical Challenges. *Bioscience* 2012; **62** : 732-743.

SCOTT RJ, GRIFFITHS CL, ROBINSON TB. Patterns of endemism and range restriction among southern African coastal marine invertebrates. *African Journal of Marine Science* 2012; **34** : 341-347.

SHARPE LL, JOOSTE MM, CHERRY MI. Handstand scent marking in the Dwarf Mongoose (*Helogale parvula*). *Ethology* 2012; **118** : 575-583.

SIRGEL WF. A new species of Oopeltidae (Mollusca, Pulmonata, Arionoidea), with a revision of the subfamily Ariopeltinae and remarks on its affinities within the family and superfamily. *African Invertebrates* 2012; **53** : 123-138.

SMITH GF, FIGUEIREDO E, KLOPPER RR, CROUCH NR, JANION C, CHOWN SL. A new specific plant host for the argave snout weevil, *Scyphophorus acupunctatus* Gyllenhal, 1838 (Coleoptera: Curculionidae) in South Africa: a destructive pest of species of *Agave* L. (Agavaceae). *BRADLEYA* 2012; **30** : 19-24.

SOUFBAF M, FATHIPOUR Y, HUI C, KARIMZADEH J. Effects of plant availability and habitat size on the coexistence of two competing parasitoids in a tri-trophic food web of canola, diamondback moth and parasitic wasps. *Ecological Modelling* 2012; **244** : 49-56.

SOUFBAF M, FATHIPOUR Y, ZALUCKI MP, HUI C. Importance of primary metabolites in canola in mediating interactions between a specialist leaf-feeding insect and its specialist solitary endoparasitoid. *Arthropod-Plant Interactions* 2012; **6** : 241-250.

STOFFBERG S, SCHOEMAN MC, MATTHEE CA. Correlated Genetic and Ecological Diversification in a Widespread Southern African Horseshoe Bat. *PLoS ONE* 2012; **7** : e31946.

TAYLOR PJ, STOFFBERG S, MONADJEM A, SCHOEMAN MC, BAYLISS J, COTTERILL FPD. Four New Bat Species (*Rhinolophus hildebrandtii* Complex) Reflect Plio-Pleistocene Divergence of Dwarfs and Giants across an Afrotropical Archipelago. *PLoS ONE* 2012; **7** : e41744.

TE BEEST M, LE ROUX JJ, RICHARDSON DM, BRYSTING AK, SUDA J, KUBESOVA M, PYSEK P. The more the better? The role of polyploidy in facilitating plant invasions. *Annals of Botany* 2012; **109**(1) : 19-45.

TERAUDS A, CHOWN SL, MORGAN F, PEAT HJ, WATTS DJ, KEYS H, CONVEY P, BERGSTROM DM. Conservation biogeography of the Antarctic. *Diversity and Distributions* 2012; **18** : 726-741.

THERON N, ROETS F, DREYER LL, ESLER KJ, UECKERMANN A. A new genus and eight new species of Tydeoidea (Acari: Trombidiformes) from Protea species in South Africa. *International Journal of Acarology* 2012; **38**(3) : 257-273.

THOMPSON GD, BELLSTEDT DU, BYRNE M, MILLAR IM, RICHARDSON DM, WILSON JRU, LE ROUX JJ. Cultivation shapes genetic novelty in a globally important invader. *Molecular Ecology* 2012; **21** : 3187-3199.

TREVENNEC K, GROSBOIS V, ROGER F, HO TH, BERTHOULY-SALAZAR C, CHEVALIER V. Evidence for freedom from swine influenza in a remote area of Northern Vietnam. *Acta Tropica* 2012; **122** : 160-163.

TURKETTI S, ESLER KJ, DREYER LL. Three-dimensional reciprocity: A new form of tristylly in South African Oxalis (*Oxalidaceae*) species and its implications for reproduction. *South African Journal of Botany* 2012; **78** : 195-202.

VALENTINE AJ, KLEINERT A, VERDIER J. The 'atom-splitting' moment of synthetic biology: Nuclear physics and synthetic biology share common features. *Embo Reports* 2012; **13** : 677-679.

VAN WILGEN BW, RICHARDSON DM. Three centuries of managing introduced conifers in South Africa: Benefits, impacts, changing perceptions and conflict resolution. *Journal of Environmental Management* 2012; **106** : 56-68.

VAN WILGEN NJ, RICHARDSON DM. The roles of Climate, Phylogenetic Relatedness, Introduction Effort, and Reproductive Traits in the Establishment of Non-Native Reptiles and Amphibians. *Conservation Biology* 2012; **26** : 267-277.

VARDIEN W, RICHARDSON DM, FOXCROFT LC, THOMPSON GD, WILSON JRU, LE ROUX JJ. Invasion dynamics of *Lantana camara* L. (sensu lato) in South Africa. *South African Journal of Botany* 2012; **81** : 81-94.

VON DER HEYDEN S, CONNELL A. Evidence of hybridisation within the genus *Chrysoblephus* and conserved nuclear sequences of South African sparids (Teleostei: Sparidae). *African Journal of Marine Science* 2012; **34** : 505-510.

WESCHE PL, ROBINSON TJ. Different patterns of Robertsonian fusion pairing in Bovidae and the house mouse: the relationship between chromosome size and nuclear territories. *Genetics Research* 2012; **94** : 97-111.

WHITE CR, FRAPPELL PB, CHOWN SL. An information-theoretic approach to evaluating the size and temperature dependence of metabolic rate. *Proceedings of the Royal Society B-Biological Sciences* 2012; **279** : 3616-3621.

WHITNEY HM, RANDS SA, ELTON NJ, ELLIS AG. A Technique for Measuring Petal Gloss, with Examples from the Namaqualand Flora. *PLoS ONE* 2012; **7** : e29476.

YUE D, MA J, GUO D, ZHANG J, DU J, SONG Y, HUI C. RS & GIS-based Spatialtemporal Analysis of Ecological Footprint and Biocapacity Pattern of Jinghe River Watershed in China: Does Supply Meet Demand?. *Advanced Materials* 2012; **356-360** : 2820-2832.

ZHANG F, TAO Y, HUI C. Organism-induced habitat restoration leads to bi-stability in metapopulations. *Mathematical Biosciences* 2012; **240** : 260-266.

ZHAO ZI-HUA, HE DA-HAN, HUI C. From the inverse density-area relationship to the minimum patch size of a host-parasitoid system. *Ecological Research* 2012; **27** : 303-309.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

GAERTNER M, FISHER JL, SHARMA GP, ESLER KJ. Insights into invasion and restoration ecology: Time to collaborate towards a holistic approach to tackle biological invasions. *NeoBiota* 2012; **12** : 57-76.

GEHRING C, TOLLEY KA, ECKHARDT FS, TOWNSEND TM, ZIEGLER T, RATSOAVINA F, GLAW F, VENCES M. Hiding deep in the trees: discovery of divergent mitochondrial lineages in Malagasy chameleons of the *Calumma nasutum* group. *Ecology and Evolution* 2012; **2** : 1468-1479.

KUMSCHICK S, BACHER S, DAWSON W, HEIKKILÄ J, SENDEK A, PLUESS T, ROBINSON TB, KÜHN I. A conceptual framework for prioritization of invasive alien species for management according to their impact. *NeoBiota* 2012; **15** : 69-100.

OLLERTON J, WATTS S, CONNERTY S, LOCK J, PARKER L, WILSON I, SCHUELLER S, NATTERO J, COCUCCI AA, IZHAKI I, GEERTS S, PAUW A, STOUT JC. Pollination ecology of the invasive tree tobacco *Nicotiana glauca*: Comparisons across native and non-native ranges. *Journal of Pollination Ecology* 2012; **9** : 85-95.

Doktoraal Afgehandel/Doctoral completed

ALBERTUS RMC. *Ecotoxicity and environmental fate of diesel and diesel blends produced by Sasol's Fischer-Tropsch processes using natural gas and coal as feedstock as well as biodiesel and biodiesel blends.* PhD, 2012. 119 pp. Supervisor: Reinecke AJ. Cosupervisor: Phillips L.

KNOWLES T. *Realising REDD in Africa: Risk, feasibility and supporting policy.* PhD, 2012. 175 pp. Supervisor: Ellis AG. Cosupervisors: Scholes RJ, Van Jaarsveld AS.

RUWANZA S. *Opportunities and constraints in the restoration of riparian ecosystems invaded by alien trees: insights from the Western Cape, South Africa.* PhD, 2012. 160 pp. Supervisor: Richardson DM. Cosupervisors: Esler KJ, Gaertner M.

TERERAI F. *The effect of invasive trees in the riparian zones and implications for management and restoration: Insights from Eucalyptus invasions in South Africa.* PhD, 2012. 137 pp. Supervisor: Richardson DM. Cosupervisors: Jacobs SM, Gaertner M.

THOMPSON GD. *Molecular ecology of two invasive legumes (Acacia saligna and Paraserianthes lophantha).* PhD, 2012. 162 pp. Supervisor: Richardson DM. Cosupervisor: Bellstedt DU.

TREASURE AM. *Climate change and invasive impacts in the sub-Antarctic.* PhD, 2012. 209 pp. Supervisor: Chown SL.

Rekenaarwetenskap | Computer Science

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

DE VILLIERS HAC, VAN ZIJL L, NIESLER TR. Vision-based hand pose estimation through similarity search using the earth mover's distance. *IET Computer Vision* 2012; **6**(4) : 285-295.

FISHER R, VAN ZYL GU, TRAVERS SAA, KOSAKOVSKY POND SL, ENGELBRECH S, MURRELL B, SCHEFFLER K, SMITH D. Deep sequencing reveals minor protease resistance mutations in patients failing a protease inhibitor regimen. *Journal of Virology* 2012; **86**(11) : 6231-6237.

KRZESINSKI AES, LATOUCHE G, TAYLOR PG. How do we

encourage an egoist to act socially in an ad hoc mobile network. *Computer Networks* 2012; **56**(15) : 3499-3510.

MURRELL B, DE OLIVEIRA T, SEEBREGTS C, KOSAKOVSKY POND SL, SCHEFFLER K. Modeling HIV-1 Drug Resistance as Episodic Directional Selection. *Plos Computational Biology* 2012; **8**(5) : 1-9.

MURRELL B, WERTHEIM JO, MOOLA S, WEIGHILL T, SCHEFFLER K, KOSAKOVSKY POND SL. Detecting Individual Sites Subject to Episodic Diversifying Selection. *Plos Genetics* 2012; **8**(7) : 1-9.

VISSER W, DWYER MB, WHALEN M. The hidden models of model checking. *Software and Systems Modelling* 2012; **11**(4) : 541-555.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

MURRELL B, SHERWARD DJ, WILLIAMSON C. Degenerate primer IDs and the birthday problem. *Proceedings of the National Academy of Sciences of the United States of America* 2012; **109**(21) : 1330.

Doktoraal Afgehandel/Doctoral completed

MURRELL B. *Improved Models of Biological Sequence Evolution.* PhD, 2012. 107 pp. Supervisor: Scheffler K.

SACEMA (SA CENTRE FOR EPIDEMIOLOGICAL MODELLING & ANALYSIS)

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

BEAUCLAIR R, KASSANJEE R, TEMMERMAN M, WELTE A, DELVA W. Age-disparate relationships and implications for STI transmission among young adults in Cape Town, South Africa. *European Journal of Contraception and Reproductive Health Care* 2012; **17** : 30-39.

DELVA W, EATON JW, MENG F, FRASER C, WHITE RG, VICKERMANN P, BOILY M-C, HALLET T. HIV Treatment as Prevention: Optimising the Impact of Expanded HIV Treatment Programmes. *Plos Medicine* 2012; **9**(7) : 1-12.

DELVA W, WILSON DP, RADDAD LA, GORGENS M, WILSON DP, HALLET T, WELTE A. HIV Treatment as Prevention: Principles of Good HIV Epidemiology Modelling for Public Health Decision-Making in All Modes of Prevention and Evaluation. *Plos Medicine* 2012; **9**(7) : 2-7.

EATON JW, JOHNSON LF, SALOMON JA, BARNIGHAUSEN T, BENDAVID E, BERSHTEYN A, BLOOM DE, CAMBIANO V, FRASER C, HONTELEZ JAN AC, HUMAIR S, KLEIN DJ, LONG EF, PHILLIPS AN, PRETORIUS C, STOVER J, WENGER EA, WILLIAMS BG, HALLET T. HIV Treatment as Prevention: Systematic Comparison of Mathematical Models of the Potential Impact of Antiretroviral Therapy on HIV incidence in South Africa. *Plos Medicine* 2012; **9**(7) : 1-20.

GERRITSEN A M, MITCHELL J S, MITCHELL JS, DELVA W. Challenges with using estimates when calculating ART need among adults in South Africa. *SAMJ South African Medical Journal* 2012; **102**(10) : 1-2.

GRANICH R, KAHN JG, BENNETT R, HOLMES CB, GARG N, SERENATA C, SABIN ML, MAHKLOUF-OBBERMEYER C, DE FILIPPO MACK C, WILLIAMS P, JONES L, SMYTH C, KUTCH KA, YING-RU L, VITORIA M, SOUTEYRAND Y, CROWLEY S, KORENROMP EL, WILLIAMS BG. Expanding ART for Treatment and Prevention of HIV in South Africa: Estimated Cost and Cost-Effectiveness 2011-2050. *PLoS ONE* 2012; **7**(2) : 1-15.

HARGROVE JW, EASTWOOD H, MAHIANE SG, VAN SCHALKWYK C. How Should We Best Estimate the Mean Recency Duration for the BED Method. *PLoS ONE* 2012; **7**(11) : 1-11.

HARGROVE JW, OUIFKI R, KAJUNGURI D, VALE GA, TORR SJ. Modeling the Control of Trypanosomiasis Using Trypanocides or Insecticide-Treated Livestock. *Plos Neglected Tropical Diseases* 2012; **6**(5) : 1-10.

HARGROVE JW, VAN SCHALKWYK C, EASTWOOD H. BED Estimates of HIV Incidence: Resolving the Differences, Making Things Simpler. *PLoS ONE* 2012; **7**(1) : 1-7.

HARGROVE JW. Age-specific changes in sperm levels among female tsetse (*Glossina* spp.) with a model for the time course on insemination. *Physiological Entomology* 2012; **37** : 278-290.

HBID ML, SÁNCHEZ E, OUIFKI R. Hopf bifurcation via the Pincaré procedure in delay-differential equations with two delays. *Revista Matemática Complutense* 2012; **s13163** : 1-11.

JOHNSTONE-ROBERTSON S, LAWN SD, WELTE A, BEKKER

L, WOOD R. Tuberculosis in a South African prison - a transmission modelling analysis. *SAMJ South African Medical Journal* 2011; **101**(11) : 809-813.

KALULA AS, NYABADZA F. A theoretical model for substance abuse in the presence of treatment. *South African Journal of Science* 2012; **108** : 1-12.

KASSANJEE R, MCWALTER TA, BARNIGHAUSEN T, WELTE A. A New General Biomarker-based Incidence Estimator. *Epidemiology* 2012; **23**(5) : 721-728.

KEEBLER DS, WALWYN D, WELTE A. Biology as Population Dynamics: Heuristics for Transmission Risk. *American Journal of Reproductive Immunology* 2012; **ajj.12040** : 1-7.

KORENROMP EL, GLAZIOU P, FITZPATRICK C, FLOYD K, HOSSEINI M, RAVIGLIONE M, ATUN R, WILLIAMS BG. Implementing the Global Plan to Stop TB, 2011-2015- Optimizing Allocations and the Global Fund's Contributions: A Scenario Projections Study. *PLoS ONE* 2012; **7**(6) : 1-10.

KRANZER K, GOVINDASAMY D, VAN SCHAIK N, THEBUS E, DAVIES N, ZIMMERMANN MA, JENEKER S, LAWN SD, WOOD R, BEKKER L. Incentivized recruitment of a population sample to a mobile HIV testing service increases the yield of newly diagnosed cases, including those in need of antiretroviral therapy. *Hiv Medicine* 2012; **13** : 132-137.

LINDH JM, LEHANE MJ, TORR SJ, VALE GA, GOSWAMI P, ARNOLD SEJ, BLACKBURN RS. Optimizing the Colour and Fabric of Targets for the Control of the Tsetse Fly *Glossina fuscipes fuscipes*. *Plos Neglected Tropical Diseases* 2012; **6**(5) : 1-9.

MAHIANE SG, OUIFKI R, DELVA W, WELTE A, BRAND H. A General HIV Incidence Inference Scheme Based on Likelihood of Individual Level Data and a Population Renewal Equation. *Plos Medicine* 2012; **7**(9) : 1-11.

MICHIENSEN K, BEAUCLAIR R, DELVA W, ROELENS K, VAN ROSSEM R, TEMMERMAN M. Effectiveness of a peer-led HIV prevention intervention in secondary schools in Rwanda: results from a non-randomized controlled trial. *BMC Public Health* 2012; **12** : 1-10.

MICHIENSEN K, TEMMERMAN M, VAN ROSSEM R, BEAUCLAIR R, DELVA W, ROELENS K. Effectiveness of a peer-led HIV prevention intervention in secondary schools in Rwanda: results from a non-randomized controlled trial. *BMC Public Health* 2012; **12** : 1-11.

RUSTOMJEE R, MCLEOD R, HANEKOM W, STEEL G, MAHOMED H, HAWKRIDGE A, WELTE A, SINANOVIC E, LOOTS G, GROBLER A, MVUSI L, GRAY GE, HESSELING A, GINSBERG A, LIENHARDT C, SHEA J, TONG X, LOCKHART S, CHURCHYARD GJ. Key issues in the clinical development and implementation of TB vaccines in South Africa. *Tuberculosis* 2012; **92**(5) : 359-364.

SHARMA UK, SCHITO M, WELTE A, ROUSSEAU C, FITZGIBBON J, KEELE B, SHAPIRO S, MCMICHAEL A, BURNS DN. Workshop Summary: Novel Biomarkers for HIV Incidence Assay Development. *Aids Research and Human Retroviruses* 2012; **28**(6) : 532-539.

SHIRI T, WELTE A. Modelling the impact of acute infection dynamics on the accumulation of HIV-1 mutations. *Journal of Theoretical Biology* 2011; **279** : 44-54.

TORR SJ, CHAMISA A, MANGWIRO TNC, VALE GA. Where, When and Why Do Tsetse Contact Humans? Answers from Studies in a National park of Zimbabwe. *Plos Neglected Tropical Diseases* 2012; **6**(8) : 1-12.

VALE GA, HALL DR, CHAMISA A, TORR SJ. Towards an Early Warning System for Rhodesian Sleeping Sickness in Savannah Areas: Man-Like Traps for Tsetse Flies. *Plos Neglected Tropical Diseases* 2012; **6**(12) : 1-9.

VAN SCHALKWYK C, CULE M, WELTE A, VAN HELDEN PD, VAN DER SPUY G. Towards Eliminating Bias in Cluster Analysis of TB Genotyped Data. *PLoS ONE* 2012; **7**(3) : 2-7.

VENKATESH KK, LURIE MN, TRICHE E W, DE BRUYN G, MODISENYANE T, GRAY GE, MARTINSON NA, WELTE A. Sexual Risk Behaviors Among HIV-Infected South African Men and Women with Their Partners in a Primary Care Program: Implications for Couples-Based Prevention. *Aids and Behavior* 2011; **16** : 139-150.

WILLIAMS BG. TB and HIV: Deadly Liaison or Manageable Threat. *Science Translational Medicine* 2012; **4**(135) : 135-150.

WLODZIMIROW KA, ESLAMI S, ABU-HANNA A, NIEUWOUDT M, CHAMULEAU RAFM. A systematic review on prognostic indicators of acute on chronic liver failure and their predictive value for mortality. *Liver International* 2012; **ISSN 1478-3223** : 1-13.

WLODZIMIROW KA, ESLAMI S, ABU-HANNA A, NIEUWOUDT M. Systematic review: acute liver failure - one disease, more than 40 definitions. *Alimentary Pharmacology & Therapeutics* 2012; **35** : 1245-1256.

WOOD R, RACOW K, BEKKER L, MORROW C, MIDDELKOOP K, MARK D, LAWN SD. Indoor Social Networks in a South African Township: Potential Contribution of Location to Tuberculosis Transmission. *PLoS ONE* 2012; **7**(6) : 1-5.

Sentrale Analitiese Fasiliteit | Central Analytical Facility

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

ALBERTS P, STANDER MA, DE VILLIERS AJ. Advanced ultra high pressure liquid chromatography-tandem mass spectrometric methods for the screening of red wine anthocyanins and derived pigments. *Journal of Chromatography A* 2012; **1235** : 92-102.

ALBRECHT CF, STANDER M A, GROBBELAAR MC, COLLING J, KOSSMANN J, HILLS PN, MAKUNGA NP. LC-MS-based metabolomics assists with quality assessment and traceability of wild and cultivated plants of *Sutherlandia frutescens* (Fabaceae). *South African Journal of Botany* 2012; **82** : 33-45.

CORNELIUS I, SWANEPOEL LC, DU PLESSIS AFJ, SLABBERT R. Looking inside votive creatures: Computed tomography (CT) scanning of ancient Egyptian mummified animals in Iziko Museums of South Africa: A preliminary report. *Akroterion: Journal for the Classics in South Africa* 2012; **57**(1) : 129-148.

DAVIDS AH, CLOETE SWP, BESTER-VAN DER MERWE AE, MUCHADEYI FC, SLABBERT R, DZAMA K. Genetic variation within and among three ostrich breeds, estimated by using microsatellite markers. *South African Journal of Animal Science* 2012; **42**(2) : 375-1589.

JAHN-AWE S, PLEUGER J, FREI D, GEROGIEV N, FROITZHEIM N, NAGEL TJ. Time constraints for low-angle shear zones in the Central Rhodopes (Bulgaria) and their significance for the exhumation of high-pressure rocks. *International Journal of Earth Sciences* 2012; **101**(7) : 1971-2004.

KÖKSAL S, MÖLLER A, GÖNCÜOĞLU MC, FREI D, GERDES A. Crustal homogenization revealed by U-Pb zircon ages and Hf isotope evidence from the Late Cretaceous granitoids of the Agoçören intrusive suite (Central Anatolia/Turkey). *Contributions to Mineralogy and Petrology* 2012; **163** : 725-743.

LONG HS, STANDER MA, VAN WYK B-E. Notes on the occurrence and significance of triterpenoids (asiaticoside and related compounds) and caffeoylquinic acids in *Centella* species. *South African Journal of Botany* 2012; **82** : 53-59.

SLABBERT R, HEPPLER J, RHODE C, BESTER-VAN DER MERWE AE, ROODT-WILDING R. New microsatellite markers for the abalone *Haliotis midae* developed by 454 pyrosequencing and *in silico* analyses. *Genetics and Molecular Research* 2012; **11**(3) : 2769-2779.

VAN TUYLL VAN SEROOSKERKEN AM, DROGEMOLLER BI, TE VELDE K, BLADERGROEN RS, STEIJLEN PM, POBLETE-GUTIERREZ P, VAN GEEL M, VAN HEERDEN CJ, WARNICH L, FRANK J. Extended haplotype studies in South African and Dutch variegated porphyria families carrying the recurrent p.R59W mutation confirm a common ancestry. *British Journal of Dermatology* 2012; **166** : 261-265.

WRIGHT TE, FREI D, STOREY M. Geochronological constraints on granitic magmatism, deformation, cooling and uplift on Bornholm, Denmark. *Geological Survey of Denmark and Greenland Bulletin* 2012; **60** : 23-46

Toegepaste Wiskunde | Applied Mathematics

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

CLOETE M, SMIT GJF. An analytical pore-scale, shear stress model for purely viscous non-Newtonian fluids traversing porous media. *Applied Mathematics and Computation* 2012; **219** : 3367-3384.

MARITZ MF, THERON WFD. Experimental verification of the motion of a loaded hoop. *American Journal of Physics* 2012; **80**(7) : 594-598.

Doktoraal Afgehandel/Doctoral completed

WILMS JM. Modelling of the motion of a mixture of particles and a Newtonian fluid. PhD, 2012. 243 pp. Promotor: Smit GJF. Medepromotor: Diedericks GJP.

WOUDBERG S. Comparative analysis of predictive equations for transfer processes in different porous structures. PhD, 2012. 373 pp. Promotor: Du Plessis JP. Medepromotor: Smit GJF, Rewitzky IM.

Wiskunde | Mathematics

Tydskrifartikels (gesubsidieer) / Journal Articles (subsidised)

AMBERG B, FRANSMAN A, KAZARIN L. Products of locally dihedral subgroups. *Journal of Algebra* 2012; **350** : 308-317.

ANDRIANTIANA EOD. More Trees with Large Energy. *Match-Communications in Mathematical and in Computer Chemistry* 2012; **68** : 675-695.

BOBOC C, DASCALESCU S, VAN WYK L. Isomorphisms between Morita context rings. *Linear & Multilinear Algebra* 2012; **60**(5) : 545-563.

BOXALL G, HIERONYMI P. Expansions which introduce no new open sets. *Journal of Symbolic Logic* 2012; **77**(1) : 111-121.

BREUER F. Special subvarieties of Drinfeld modular varieties. *Journal Fur Die Reine und Angewandte Mathematik* 2012; **668** : 35-57.

DU R, PRODINGER H. Notes on protected nodes in Digital Search Trees. *Applied Mathematics Letters* 2012; **25**(6) : 1025-1028.

FISHER R, VAN ZYL GU, TRAVERS SAA, KOSAKOVSKY POND SL, ENGELBRECH S, MURRELL B, SCHEFFLER K, SMITH D. Deep sequencing reveals minor protease resistance mutations in patients failing a protease inhibitor regimen. *Journal of Virology* 2012; **86**(11) : 6231-6237.

FUCHS M, LEE CK, PRODINGER H. Approximate Counting via the Poisson-Laplace-Mellin Method. *Discrete Mathematics and Theoretical Computer Science* 2012; **AQ** : 13-28.

GOEDECKE J, JANELIDZE T. Relative Goursat Categories. *Journal of Pure and Applied Algebra* 2012; **216**(8-9) : 1726-1733.

GRABNER PJ, PRODINGER H. Additively irreducibles in alpha-expansions. *Publications Mathematicae-Debrecen* 2012; **80** : 405-415.

GRAN M, JANELIDZE Z, RODELO D, URSINI A. Symmetry of Regular Diamonds, the Goursat Property, and Subtractivity. *Theory and Applications of Categories* 2012; **27**(6) : 80-96.

GRAN M, JANELIDZE Z, RODELO D. 3 x 3 Lemma for Star-Exact Sequences. *Homology Homotopy and Applications* 2012; **14**(2) : 1-22.

GRAN M, JANELIDZE Z, URSINI A. A good theory of ideals in regular multi-pointed categories. *Journal of Pure and Applied Algebra* 2012; **216** : 1905-1919.

GRAY JRA. Algebraic exponentiation for categories of Lie algebras. *Journal of Pure and Applied Algebra* 2012; **216** : 1964-1967.

GUTMAN I, FURTULA B, ANDRIANTIANA EOD, CVETIC M. More Trees with Large Energy and Small Size. *Match-Communications in Mathematical and in Computer Chemistry* 2012; **68** : 697-702.

GUTMAN I, WAGNER S. The matching energy of a graph. *Discrete Applied Mathematics* 2012; **160** : 2177-2187.

JANELIDZE Z, MARTINS-FERREIRA N. Weakly Mal'tsev categories and strong relations. *Theory and Applications of Categories* 2012; **27**(5) : 65-79.

JANELIDZE Z. An axiomatic survey of diagram lemmas for non-abelian group-like structures. *Journal of Algebra* 2012; **370** : 387-401.

KALULA AS, NYABADZA F.A. A theoretical model for substance abuse in the presence of treatment. *South African Journal of Science* 2012; **108** : 1-12.

KILIC E, PRODINGER H. The q-Pilbert Matrix. *International Journal of Computer Mathematics* 2012; **89**(10) : 1370-1377.

KNOPFMACHER A, MUNAGI A, WAGNER S. Successions in Words and Compositions. *Annals of Combinatorics* 2012; **16** : 277-287.

KRZESINSKI AES, LATOUCHE G, TAYLOR PG. How do we encourage an egoist to act socially in an ad hoc mobile network. *Computer Networks* 2012; **56**(15) : 3499-3510.

LOUCHARD G, PRODINGER H, WARD MD. Number of Survivors in the Presence of a Demon. *Periodica Mathematica Hungarica* 2012; **64** : 101-117.

LOUCHARD G, PRODINGER H. The Asymmetric Leader Election Algorithm with Swedish Stopping: A Probabilistic Analysis. *Discrete Mathematics and Theoretical Computer Science* 2012; **14**(2) : 91-128.

MARITZ P, MOUTON S. Francis Guthrie: A Colourful Life. *Mathematical Intelligencer* 2012; **34**(3) : 67-75.

MEYER J, SZIGETI J, VAN WYK L.A. Cayley-Hamilton trace identity for 2 x 2 matrices over Lie-solvable rings. *Linear Algebra and Its Applications* 2012; **436** : 2578-2582.

MULLER MA. Handling uncertainty in a court of law. *Stellenbosch Law Review* 2012; **23**(2) : 370-380.

- OLIVER K, PRODINGER H.** The continued fraction expansion of Gauss' hypergeometric function and a new application to the tangent function. *Transactions of the Royal Society of South Africa* 2012; **67**(3) : 151-154.
- PANHOLZER A, PRODINGER H.** Asymptotic results for the number of paths in a grid. *Bulletin of the Australian Mathematical Society* 2012; **85** : 446-455.
- PORST H-E.** Takeuchi's free Hopf algebra construction revisited. *Journal of Pure and Applied Algebra* 2012; **216** : 1768-1774.
- PRODINGER H.** Approximate counting with m counters: a detailed analysis. *Theoretical Computer Science* 2012; **439** : 58-68.
- PRODINGER H.** Dyck Paths with Parity Restrictions for the Final Runs to the Origin: A Study of the Height. *Fundamenta Informaticae* 2012; **117** : 279-285.
- PRODINGER H.** On Touchard's continued fraction and extensions: combinatorics-free, self-contained proofs. *Quaestiones Mathematicae* 2012; **35** : 431-445.
- PRODINGER H.** Pseudo q-Engel expansions and Rogers-Ramanujan type identities. *Quaestiones Mathematicae* 2012; **35** : 23-33.
- PRODINGER H.** The number of restricted lattice paths revisited. *FILOMAT* 2012; **26** : 1130-1131.
- RALAIVAOSAONA D.** A phase transition in the distribution of the length of integer partitions. *Discrete Mathematics and Theoretical Computer Science* 2012; **AQ** : 265-282.
- RALAIVAOSAONA D.** On the Distribution of Multiplicities in Integer Partitions. *Annals of Combinatorics* 2012; **16** : 871-889.
- RALAIVAOSAONA D.** On the number of summands in a random prime partition. *Monatshefte für Mathematik* 2012; **166** : 505-524.
- RAZAFINDRAKOTO AD.** On coarse and fine neighbourhood operators. *Topology and Its Applications* 2012; **159** : 3067-3079.
- SCHMUCK NS, WAGNER S, WANG H.** Greedy Trees, Caterpillars, and Wiener-type Graph Invariants. *Match-Communications in Mathematical and in Computer Chemistry* 2012; **68** : 273-292.
- SZIGETI J, VAN WYK L.** The zero-level centralizer in endomorphism algebras. *Proceedings of the Royal Society of Edinburgh Section A-Mathematics* 2012; **142A** : 1325-1336.
- WAGNER S, WILD MMW.** Decomposing the hypercube Q_n into n isomorphic edge-disjoint trees. *Discrete Mathematics* 2012; **312** : 1819-1822.
- WAGNER S.** Additive tree functionals with small toll functions and subtrees of random trees. *Discrete Mathematics and Theoretical Computer Science* 2012; **AQ** : 67-80.
- WAGNER S.** Energy Bounds for Graphs with Fixed Cyclomatic Number. *Match-Communications in Mathematical and in Computer Chemistry* 2012; **68** : 661-674.
- WAGNER S.** On the Wiener index of random trees. *Discrete Mathematics* 2012; **312** : 1502-1511.

Tydskrifartikels (ongesubsidieer) / Journal Articles (non-subsidised)

- BREUER F.** Newton Identities for Weierstrass Products. *The Mathematical Association of America* 2012; **119** : 796-799.
- MARITZ P.** Extensions of Lattice Set Functions to Regular Borel Measures. *Journal of Informatics and Mathematical Sciences* 2012; **4**(1) : 1-14.
- OLIVER K, PRODINGER H.** Consecutive records in geometrically distributed words. *Afrika Matematika* 2012; **23** : 163-172.
- PRODINGER H.** Set partitions, words, and approximate counting with black holes. *Australasian Journal of Combinatorics* 2012; **54** : 303-310.
- WILD MMW.** Compactly Generating All Satisfying Truth Assignments of a Horn Formula. *Journal on Satisfiability, Boolean Modeling and Computation* 2012; **8** : 63-82.

Doktoraal Afgehandel/Doctoral completed

- GAVHI MR.** *Refinable functions with prescribed values at the integers.* PhD, 2012. 113 pp. Supervisor: De Villiers JM.
- MUZUNDU K.** *Spectral theory in commutatively ordered Banach algebras.* PhD, 2012. 97 pp. Supervisor: Mouton S.
- RALAIVAOSAONA D.** *Limit theorems for integer partitions and their generalisations.* PhD, 2012. 81 pp. Supervisor: Wagner S.
- SSEBULIBA J.** *In-vivo Mathematical Modelling fo the Coinfection Dynamics of HIV-1 and HHV-8.* PhD, 2012. 161 pp. Supervisors: Hargrove J, Lungu EM.
- VAN DER BIJL R.** *Bivariate wavelet construction based on solutions of algebraic polynomial identities.* PhD, 2012. 112 pp. Supervisor: De Villiers JM.

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