

# Nuclear Physics

## at Stellenbosch University

Nuclear Physics explores the structure and properties of nuclear matter and probes the fundamental interactions between the constituents of the atomic nucleus.

A large part of our research activities revolve around the experimental programs which exist at iThemba Laboratories for Accelerator Based Sciences at Faure, South Africa. In addition to this we provide theoretical support for projects at iThemba LABS as well as a number of other Nuclear Physics projects in other parts of the world. Furthermore, members of our research group are involved with projects in applied nuclear science.

For more information on our courses visit the website of the Physics Department:

<http://www.sun.ac.za/physics>

Or contact:

Dr. SM Wyngaardt

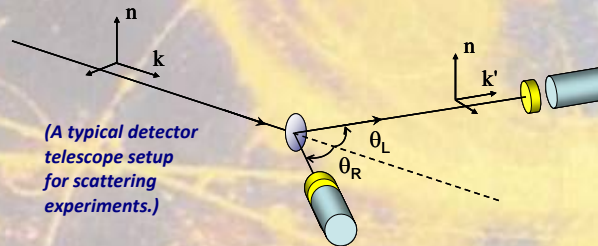
Email: [shaunmw@sun.ac.za](mailto:shaunmw@sun.ac.za)

Tel: (021) 808 3391

## Research Fields

### Nuclear Reaction Studies

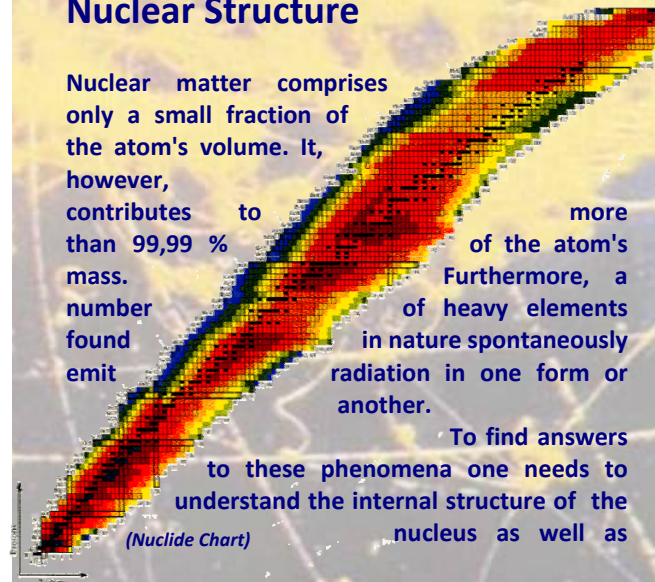
We use nuclear reactions to extract information about the atomic nucleus and it helps us to understand the basic forces which play a role in nature. The probes we use include medium energy polarized proton beams, alpha particles, and a range of light and heavy ion beams.



An understanding of the fundamental reactions inside the nucleus is also useful to Engineers, Astrophysicists and Geologists.

### Nuclear Structure

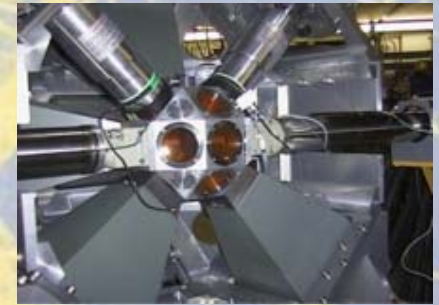
Nuclear matter comprises only a small fraction of the atom's volume. It, however, contributes to more than 99,99 % of the atom's mass. Furthermore, a number of heavy elements found in nature spontaneously emit radiation in one form or another.



To find answers to these phenomena one needs to understand the internal structure of the nucleus as well as

the various excited states which nuclei might be found in.

Other research topics in nuclear structure includes clustering in heavy nuclei, production of lepton induced strange matter, particle correlations in ultra-relativistic heavy ion collisions, the formation of exotic nuclear matter and the development of an equation of state for neutron stars based on a relativistic mean field model.



The AFRODITE gamma-ray spectrometer at iThemba LABS

## Our Group

The Nuclear Physics group is the oldest of the three research groups at Stellenbosch University. We have built up strong and healthy collaborations with a number of local as well as international groups across the globe over the past decades. The group consists of more than 30 members and is currently showing strong growth in its membership.

