

Overview of Nuclear Physics Experimental Facilities at iThemba LABS, South Africa

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iThemba LABS is a home to the Separated Sector Cyclotron which is the most powerful accelerator in the southern hemisphere. This cyclotron produces beams ranging from heavy to light ions up to a maximum energy of 200 MeV. The heavy ion projectiles emit gamma-rays which are being detected using the AFRican Omnipurpose Detector for Innovative Technologies and Experiments (AFRODITE). AFRODITE is a medium size array that has the unique capability of detecting both high and low energy photons with a reasonably high efficiency by combining large volume escape suppressed HPGe detectors (CLOVERS) with Low Energy Photon Spectrometer (LEPS) detectors. There also exists a state-of-the-art K600 Magnetic Spectrometer which is a unique facility world-wide for the study of nuclear structure and reaction mechanisms at intermediate energies using light-ion projectiles. In particular, high energy-resolution experiments on nuclei in the region of giant resonances present a powerful tool to extract information about the dominant processes leading to equilibration. Other experiments include the (α, α') and ($^3\text{He}, d$) reactions for the investigation of the Hoyle state in ^{12}C , and (p, t) for characterisation of cluster states in ^{16}O with nuclear astrophysics applications. Experimental results, recent upgrades and future research program in maximising the capability of these unique facilities will be presented.