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Overview of Ion Beam Analysis (IBA) actitivities at iThemba LABS-NRF

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iThemba LABS is a facility that houses various research accelerators, including the latest 3 MV TandetronTM accelerator, which was installed in 2017 to replace the 51-year-old 6 MV CN Van de Graaff accelerator. High Voltage Engineering Europa B.V. (HVE) was responsible for installing and commissioning the new accelerator in the Tandetron Laboratory. The accelerator has the ability to accelerate charged particles to MeV energies from three ion sources, including a Cs sputter source for heavy ions and two multi-cusp ion sources for helium ions and protons. The primary purpose of the accelerator is to facilitate research in ion beam analysis (IBA) and low-energy astrophysics.

The 3 MV TandetronTM accelerator is linked to the experimental section through 90-degree analyzing and switching magnets that direct the charged particle beam into the experimental chambers. Currently, two active beam lines are designated for solid-state physics techniques like Rutherford Backscattering Spectrometry (RBS) and Elastic Recoiled Detection Analysis (ERDA), as well as nuclear microprobe-based techniques such as Particle-Induced X-ray Emission (PIXE) and proton beam writing. Another beam line is under commissioning for astrophysics-related research projects.

The ion sources available with the accelerator can produce high-intensity beams of 200 eμA and 25 eμA for protons and helium light ions, respectively, and a maximum of 150 μA for heavy ions at the terminal voltage of 3 MV. This makes the accelerator particularly promising for materials research areas such as ion implantation, radiation hardness testing, and shielding studies.

The Tandetron laboratory has recently expanded its research areas to include studies associated with laser-matter interaction using femtosecond lasers, diffusion kinetics studies in nuclear waste storage materials and hydrogen storage materials, measurement of fundamental parameters in ion-matter interactions, and surface texturing or patterning using proton beams.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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