



Contribution ID: 103

Type: Oral

Phase 0 of the Low-Energy Radioactive-Ion Beam Project at iThemba LABS

The Low-Energy Radioactive-Ion Beam (LERIB) project of iThemba LABS begins with Phase 0 – the construction of an Isotope Separation OnLine (ISOL) facility to produce radioactive-ion beams. A primary beam of 66 MeV protons, of up to $1 \mu\text{A}$ intensity, will impinge on carbide targets in a target/ion-source (front-end) that is similar to that of the SPES facility [1] at INFN Legnaro, and the ISOLDE facility[2] at CERN. Low-energy (< 60 keV) beams will be extracted and mass-separated using a magnet with a resolution of one part in 3000.

An offline test-facility, which comprises the target/ion-source “front-end” and a beamline with an analysing magnet, has been established and is presently being used to simulate RIB production and to develop new ion-sources. Consulting engineers are presently performing the detailed design for the on-line facility, which will make use of a disused vault at iThemba LABS. It is envisaged that construction will commence this year. With the addition of tunable lasers, the facility will be used to develop new techniques for the extraction and separation of radioactive-ion beams, such as laser ionization within an arc-discharge cavity, in addition to providing selected beams for research.

[1] http://www.scholarpedia.org/article/The_LNL_radioactive_beam_facility

[2] http://www.scholarpedia.org/article/The_ISOLDE_facility

[3] T. Day Goodacre et al. Nucl. Instrum. Meth. B 376:39-45 (2016)

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Session Classification: Collaborations and Networking