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Facilities and Research at iThemba LABS

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The premier accelerator at iThemba LABS is the k=200 Separated Sector Cyclotron (SSC). It has been used in the past for nuclear physics research, radioisotope production, and hadron therapy. It will soon be augmented by the South African Isotope Facility (SAIF) with the acceptance of a recently acquired IBA C70 cyclotron that will be dedicated to the production of radioisotopes, principally ^{82}Sr, ^{68}Ge, and ^{22}Na. This will mean that the main cyclotron of iThemba LABS, the SSC, will in future be free to be dedicated to research, although major on-going refurbishments are planned.

New instrumentation that will be available includes the GAMKA detector array, which replaces the existing AFRODITE array, and is equipped with up to 19 HPGe clover detectors, and an array of 21 large volume LaBr3 detectors (ALBA). These detectors can also be combined with the existing k=200 spectrometer for studies of e.g. giant resonances and strength functions. The β-decay tape station has also been upgraded to be able to accommodate up to eight clover detectors and a Si(Li) conversion electron detector.

iThemba LABS has a Low-Energy Radioactive-Ion Beam (LERIB) project to produce RIB's of up to 60 keV energy using the Isotope Separation OnLine (ISOL) method. The target/ion-source "front-end"has been installed in an off-line test facility. It is the same as that employed in the SPES project[1] of INFN Legnaro, in Italy, which is derived from the ISOLDE front-end[2] at CERN. The off-line test facility is routinely producing surface-ionized stable beams. Funding is being sought to move the front-end to an online facility, which is called LERIB Phase 0. In the meantime, work on the offline facility includes the development of a forced electron beam-induced arc discharge (FEBIAD) ion-source, and the development of beams of radiobiological interest such as the isotopes of terbium.

[1] G de Angelis et al 2015 J. Phys.: Conf. Ser. 580 012014
[2] ed. Ames, J. Cederkall, T. Sieber, F. Wenander CERN–2005–009

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