

THE SOUTH AFRICAN ISOTOPE FACILITY

The iThemba Laboratory for Accelerator Based Sciences (iThemba LABS) a National Research Facility within the NRF and the premier atomic particle accelerator laboratory on the African continent and the only facility of its kind in the southern hemisphere, is celebrating 30 years of operations with the Separated Sector Cyclotron (SSC), an accelerator which produces particle beams for nuclear research as well as for the production of radioisotopes. iThemba LABS plays a pivotal role in the National System of Innovation (NSI) through its collaboration network with South African Universities and Institutions. The facility also enjoys a prominent global position and plays a critical role in co-ordinating the African contribution in collaborative initiatives with various prestigious institutions. The current research and production of accelerator-based radioisotopes is a demonstration of basic and applied research being translated into innovative real world solutions. iThemba LABS is now a world leader in the accelerator-based production of long-lived radioisotopes for use in a range of medical diagnostic procedures.

To maintain and increase the excellence of the research and training activities of iThemba as well as respond to the demands from the research and isotope supply, iThemba LABS has developed a globally competitive research strategy and a related research infrastructure acquisition plan, that will strengthen its alignment to the Strategic Objectives of the NRF and will also contribute directly to the achievement of national and continental imperatives of health, the bio-economy, sustainable energy, and the development of a transformed and highly skilled workforce for South Africa's long term nuclear build programme.

The strategy is to create the **South African Isotope Facility (SAIF)**. The plan will be executed mainly through the acquisition of a new 70 MeV cyclotron, and is based on two distinct but equally important phases, namely:

- The **Accelerator Centre for Exotic Isotopes (ACE Isotopes)** which will allow for the migration of the radioisotope production programme from the existing SSC to the proposed new 70 MeV cyclotron, and will release capacity on the existing SSC to be entirely used for transdisciplinary research agenda of the facility, including the use of the Low Energy Rare Isotope Beam (LERIB) facility and developing new and innovative radioisotopes for medical therapy and diagnostics.
- The **Accelerator Centre for Exotic Beams (ACE Beams)** to post- accelerate artificially produced isotopes from Low Energy Radioactive Beams (LERIB), thus significantly expanding research activities. The production of exotic radioactive beams will invigorate basic research in order to understanding the origin and creation of chemical elements in the universe.

The benefits from the project will be realised through the:

- Increase in beam time availability for research (capacity will increase by a factor of three);
- Development of new research fields and applications including:
 - Research into new and innovative solutions for cancer treatment and early diagnostics;
 - Fundamental research into sub-atomic physics to obtain an understanding of the astrophysical origin of the elements;
 - Radiation hardness testing for the space sciences;
 - Research into the development of nano-materials; and
 - A doubling of the number of post- graduates supported by the facility.
- Increased radioisotope supplies for both the local and international hospitals and medical centers