

MODELLING OF THE RADIATION AND SHIELDING AT THE SOUTH AFRICAN ISOTOPE FACILITY USING FLUKA

**A.H. BARNARD, P. BEUKES, J.I. BROODRYK, G.F. STEYN,
I.L. STRYDOM**

iThemba LABS, Cape Town, South Africa

The South African Isotope Facility (SAIF) is a radioisotope production facility currently under construction at iThemba LABS in Cape Town. A commercial 70 MeV proton cyclotron from IBA with a number of beam lines equipped with isotope production stations, are being installed in retrofitted concrete vaults. The completion of SAIF will greatly increase the radioisotope production capability of iThemba LABS, and enable the existing Separated Sector Cyclotron to be dedicated to nuclear research activities.

As part of the design process of the SAIF facility, radiation and shielding calculations were performed using FLUKA to assess the expected dose levels for radiation safety purposes. An overview of the simulations is provided, discussing the FLUKA setup and initial validation simulations performed to gain confidence in the results. A more detailed discussion of some specific systems is given, specifically:

- A multi-layered iron-wax-lead neutron shielding of the isotope production stations;
- A louvre type shield for use in pre-existing air ducting labyrinths;
- Access labyrinths used by a robotic target transport system;
- Radiation leakage through gaps between the concrete roof beams in the vaults.

As part of an experimental validation campaign an experiment to assess the leakage rate between the roof beams in an existing vault was performed and this is compared to the FLUKA predictions.