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The Division of Radiation Biophysics at iThemba LABS – Current and future projects.

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At iThemba LABS, the Radiation Biophysics division forms part of the Separated Sector Cyclotron Laboratory and consists of two subgroups: Medical Physics and Radiobiology. Research in the Biophysics division is divided into three main areas: Medical physics, Radiation protection and Cancer research. In Medical Physics, research is focused on developing microdosimetry protocols and equipment and computational modelling of the radiation field produced by iThemba's clinical proton research beamline. As Biophysics division is the SAHPRA-designated laboratory for occupationally overexposed radiation workers, Biodosimetry forms one of the research streams under the Radiation protection. Also in the Radiation protection area is Spaceflight Radiobiology, in light of iThemba's 200 MeV cyclotron's ability to produce both high-energy proton and neutron beams to simulate intra-spacecraft radiation fields.

The Cancer research area is divided into two main streams: Theranostics and Preclinical research. The Theranostics stream was established to investigate and in vitro-validate the new and exotic radiolabelled compounds developed at iThemba's nuclear medicine department while the Preclinical stream explores various natural extracts and commercial drugs with radiosensitising or radioprotective potential for modern cancer therapies. The genetic evolutionary mechanism of cancer-resistance is also investigated in the Preclinical stream, along with novel cancer treatment modalities. These research streams facilitate a range of interesting and novel research projects that are capacitated by a small complement of iThemba staff, postdocs and post graduate students in collaboration with external university users and international collaborators. Local collaborators range from universities and HDIs to privately funded institutions, while fruitful international collaborations exist with Germany, Italy, Belgium and Switzerland. Here, we present an overview of the Radiation Biophysics division, the infrastructure available for internal projects and external users and the range of current and future projects.

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