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Development and Operation of High-Power Target Systems at TRIUMF

Tuesday, 4 October 2022 17:00 (30 minutes)

With over five decades of experience in the production of accelerator-based secondary particles for science, TRIUMF ensures that Canada remains on the leading edge of supplying radioisotopes, neutrons, photons, and muons enabling fundamental science in the fields of nuclear, particle and astrophysics, as well as solid state and medical sciences and applications.

ISAC-TRIUMF is the only ISOL facility worldwide that routinely produces radioisotope beams from targets irradiated in the high-power regime in excess of 10 kW. TRIUMF's current flagship project ARIEL, Advanced Rare IsotopE Laboratory, will add two new target stations providing isotopes to the existing experimental stations in ISAC I and ISAC II at keV and MeV energies, respectively. In addition to the operating 500 MeV, 50 kW proton driver from TRIUMF's main cyclotron, ARIEL will make use of a 30 MeV, 100 kW electron beam from a newly in-house designed and build superconducting linear accelerator. Together with additional 200 m of radioisotope beamlines within the radioisotope distribution complex, this will put TRIUMF in the unprecedented capability of delivering three isotope beams to different experiments, while producing radioisotopes for medical applications simultaneously –enhancing the scientific output of the laboratory significantly.

The results of 20 years of operational experience and target and ion source developments at ISAC is being used to design and build the ARIEL target stations. These new designs are, in turn, applied to inform a fundamental ISAC target systems refurbishment campaign that addresses ageing infrastructure, as well as the raising demand for new beams, increased beam intensity and purity, facility uptime, radiation safety and operational efficiency.

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