

TRIUMF e-Linac facility and ERL upgrade

Monday, 3 October 2022 14:10 (15 minutes)

The TRIUMF electron linear accelerator (e-Linac) was conceived to be one of the two main drivers for the upcoming Advanced Rare Isotope Facility (ARIEL). The e-Linac has been commissioned up to 10 kW of average beam power at 30 MeV, for both CW and pulsed beam. It is envisioned for this facility to eventually be upgraded to an Energy Recovery Linac (ERL), with a preliminary design having already been developed by former PhD student Chris Gong. This design includes a recirculating ring, a free electron laser and an additional particle gun feeding into the main linac. ARIEL is projected to come online by 2025, tripling the amount of rare isotope beams produced at TRIUMF. Until then, the e-Linac will be operated as a multi-user facility to take full advantage of the scientific potential of this facility. The FLASH experiment, making use of the medium energy section, will irradiate test samples with short, high intensity doses of radiation for cancer research. The DarkLight experiment, operating in the high energy section, will search for a so-called “dark photon”, a potential force carrier for dark matter motivated by the Atomki anomaly. The high-brightness Thz infrared photon source project, tied closely with the ERL upgrade, will demonstrate the production of high intensity broadband radiation and establish a dedicated material science user community at TRIUMF. ARIEL and these external projects will all depend significantly on the reliability of the e-Linac, which is a main focus of the Accelerator Division in the coming years. In light of this, I am working on a project directly relevant to the ERL community, which studies the migration of dust and mitigation of field emission in SRF cavities.

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Session Classification: Facility Reports

Track Classification: Facility Reports