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Laser resonance ionization laser ion source(s) for radioactive ion beam delivery at TRIUMF

Friday, 24 October 2025 09:00 (20 minutes)

Resonant ionization laser ion sources (RILIS) are highly efficient, element selective ion sources that are simple to implement at radioactive ion beam facilities, as the ion source's complexity is far removed from the high radiation, high temperature environment of the ISOL target & ion source region. With modern solid state laser technology a RILIS can operate reliably for the duration of week long RIB experiments with minimal supervision and intervention.
By now the RILIS at TRIUMF's isotope separator and accelerator facility provides about 75% of all requested RIB species on a 24/7h operational basis –with isotopes from 43 elements already successfully delivered and 13 elements ready for on-line yield measurements and beam delivery.
For the additional proton target station and photo-fission target stations, which will extend the RIB program at ISAC to up to 3 simultaneous beams to experiments, two additional RILIS are planned. One of these has been funded –and will be implemented in 2026. This RILIS will provide laser beams via an optical switch-yard to either the proton or the photo-fission target station. The third RILIS is planned to be added in the 2030 funding cycle, to provide fully independent RILIS capability and simultaneous operation on all 3 target stations.
The operational experience and developments with the current RILIS and its impact on the design and realization of the new ARIEL RILIS will be discussed.

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