Target and Ion Source Development for Better Beams in the ARIEL Era

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Goals

- Create an off-line system dedicated to target and ion source development
- Explore new opportunities for RIB production and delivery in the ARIEL era
- Test and verify that the ARIEL ion source system will meet stated requirements

Proposed OATIS Layout

OATIS can be built to mirror the ARIEL ion optics. The test stand can then be used to translate developments off-line to the on-line system.

Pre- Separator Diagnostics

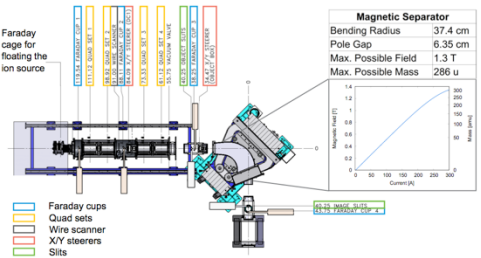
- Faraday cups with electron suppression for reading picoamps
- Wire scanners for beam positioning

Post-Separator Diagnostics

- Faraday cup
- Wire scanner
- MCP for low beam currents and time resolution
- Emittance station for beam quality diagnostics

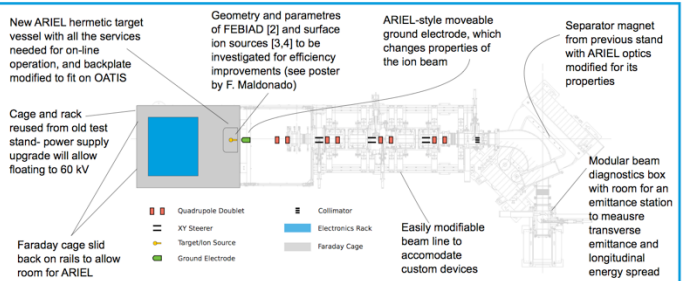
Present Test Stand Layout

Developments in this poster will be used to benefit TRIUMF's flagship facility, the **Advanced Rare IsotopE Lab** (ARIEL) [1]. ARIEL is a next generation radioactive beam facility which will employ a super-conducting e-linac to produce one driver beam and a proton beam as the second driver.



A previous test stand will be used as a starting point to build **a dedicated target and ion source test stand** called OATIS (Optimization of ARIEL Targets and Ion Sources).

Already present is a Faraday cage with racks, which will allow beams of energy up to **60 keV** to be produced, a separator magnet for the **identification of produced ions**, a beamline, and various **ion optics** and **diagnostics**. Modifications are required for the test stand to function with beam currents in the picoamp range.



Future Tests with OATIS

- Can we produce a beam with $\Delta E < 1$ eV and $\varepsilon_{90\%} < 3$ μm at 60 keV?
- Can we produce beams at 12 keV with < 50% efficiency loss?
- Can we improve the robustness and efficiency of our FEBIAD and surface ion sources?
- Which beams can we extract as molecules?

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[1] J. Dilling et. al. eds., *ISAC and ARIEL: The TRIUMF Radioactive Beam Facilities and the Scientific Program*. Springer, 2014.
[2] R. Kirchner and E. Roeckl, Nucl. Instr. Meth.**133** (1976) 187-204
[3] G.J. Beyer et. al., Nucl. Instr. Meth. **96** (1971) 437-439
[4] P.G. Bolson et. al., Nucl. Instr. Meth. **106** (1973) 83-87