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## The new IGISOL off-line ion guide quadrupole mass spectrometer system and applications

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Currently the off-line testing and development setup of the IGISOL-4 facility [1] at the Accelerator Laboratory of the University of Jyväskylä, is being upgraded. The off-line station is an independently operated ion guide quadrupole mass spectrometer system that is used not only for off-line measurements, but is needed as a development and testing platform for ion guides and other IGISOL front end systems. The new IGISOL-4 facility is now fully operational and due to high demand for on-line (and indeed off-line) operation, an independent infrastructure is required to support the ongoing developments.

During the upgrade, the vacuum chambers and ion optics were reconstructed for optimized ion beam transmission and differential pumping in order to accommodate more stringent requirements for current projects which include cryogenic ion guide development and a Cf-252 fission fragment source. Characterization of a cryogenic ion guide, initiated at IGISOL-3 [2], is now being continued with the coupling of the IGISOL light ion fusion-evaporation gas cell to a cryocooler with the aim of realizing gas cell operation at temperatures down to 30 K. This is primarily motivated by the requirement for the purification of N-14 from the helium buffer gas in order to perform high-precision mass measurements of O-14, a superallowed beta emitter. Additionally, we plan to investigate gas purification and the sensitivity of extraction efficiency as a function of temperature.

The Cf-252 fission fragment source is planned to be installed in a dedicated gas cell in order to be used together with laser resonance ionization for ionization scheme development and to perform spectroscopy on refractory elements. Further studies on the elemental dependency of the extraction efficiency are also planned. Finally, the off-line rig is also well suited to probe supersonic gas jets [3], specifically the study of the effect on resonance linewidth due to the reduced temperature and pressure, as well as extraction of flow velocity and distribution of ions in the gas jet.

In this contribution we present the status of these activities and first results of the performance of the upgraded off-line station.

[1] I.D. Moore et al., Nucl. Instrum. Methods Phys. Res. B 317, 208 (2013)

[2] A. Saastamoinen et al., Nucl. Instrum. Methods Phys. Res. A 685, 70 (2012)

[3] M. Reponen et al., Nucl. Instrum. Methods Phys. Res. A 635, 24 (2011)

**Primary author:** Mr POHJALAINEN, Ilkka (University of Jyväskylä)

**Co-authors:** JOKINEN, Ari (University of Jyväskylä); PAPADAKIS, Filippas (University of Jyväskylä); MOORE, Iain David (University of Jyväskylä); RINTA-ANTILA, Sami (University of Jyväskylä)

**Presenter:** Mr POHJALAINEN, Ilkka (University of Jyväskylä)

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