

AN OFF-LINE ION GUIDE QUADRUPOLE MASS SPECTROMETER (IGQMS) SYSTEM

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The new IGISOL-4 facility [?] at the Accelerator Laboratory of the University of Jyväskylä, being now fully operational with high demand for on-line operation, is in need of off-line testing and development time. A new off-line station is being developed to support the on-going experiments. This station is based on an independently operating ion guide quadrupole mass spectrometer (IGQMS) system, consisting of an ion source, a differential pumping system, a quadrupole mass spectrometer and a variety of detectors.

Current and future projects include the development of a cryogenic ion guide and a Cf-252 fission source. The cryogenic ion guide aims to demonstrate the removal of gas impurities from the helium buffer gas, which is used as a medium for thermalizing and stopping radioactive recoils. Achieving ultra-pure conditions is a necessity for the survival of the radioactive ions of interest as they are transported out of the ion guide with the buffer gas. Further plans are to study the sensitivity of the ion guide extraction efficiency as a function of temperature with a Ra-223 alpha-recoil source. The Cf-252 source will be used to study resonance ionization spectroscopy of refractory elements and elemental extraction efficiency dependence. The off-line station also offers the possibility to study gas jet properties. By using resonant laser ionization, the density and velocity profiles of gas jets formed with different ion guide nozzle shape can be extracted.

The current status of the ion guide quadrupole mass spectrometer will be presented.

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