High Resolution Laser Spectroscopy of Actinide Elements Within the LISA Network

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LISA
LASER IONISATION AND SPECTROSCOPY OF ACTINIDES

LISA

Laser Ionization and Spectroscopy of Actinides

The project aim to develop and push the limits of current knowledge in the actinide region by joining the expertise and capabilities coming from academic research institutions as well as industrial partners.

In-gas-cell laser ionization

- Gas Phase Chemistry
- Development of a grating Ti:Sa Laser
- Investigation of Ionization schemes

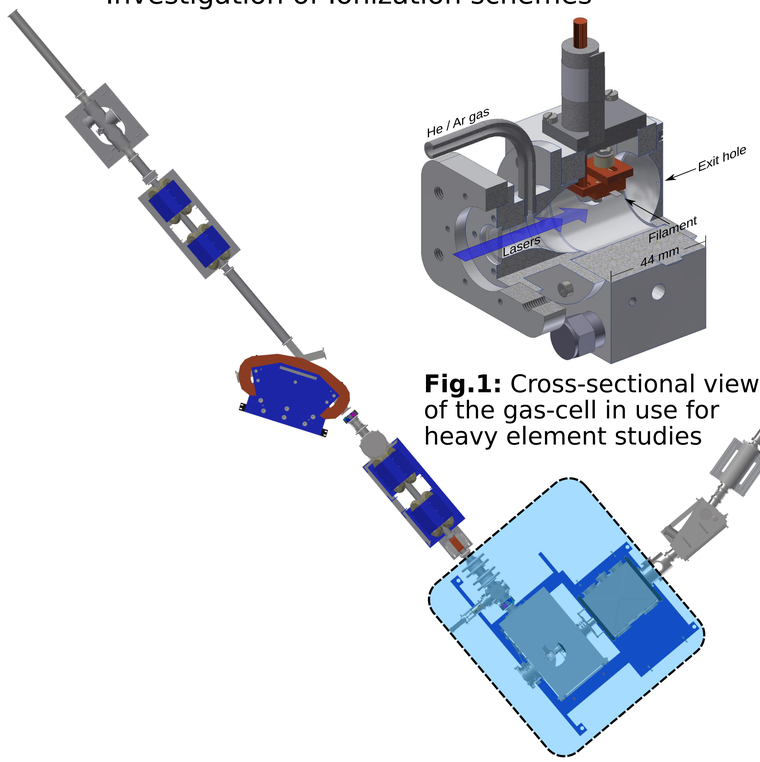
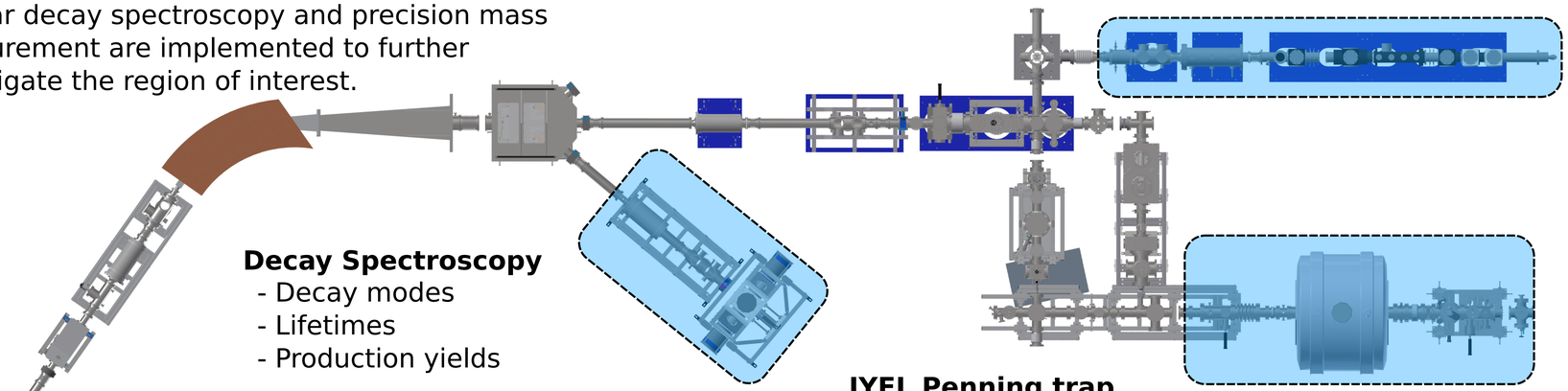


Fig.1: Cross-sectional view of the gas-cell in use for heavy element studies

IGISOL

Ion Guide Isotope Separation On Line

IGISOL facility in the Accelerator Laboratory of the University of Jyväskylä is at the forefront in the application of laser spectroscopy techniques for the extraction of nuclear ground-state properties. In addition to optical spectroscopy, nuclear decay spectroscopy and precision mass measurement are implemented to further investigate the region of interest.



Decay Spectroscopy

- Decay modes
- Lifetimes
- Production yields

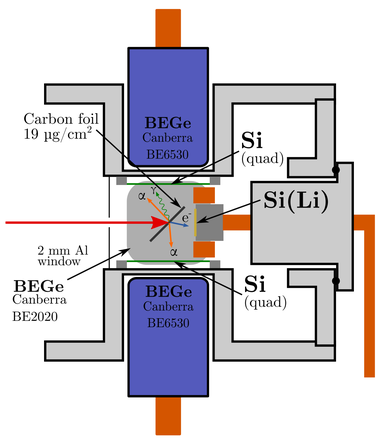


Fig.2: Decay station setup mounted at the end of the IGISOL spectroscopy line

High resolution collinear laser Spectroscopy

Hyperfine structure
- Nuclear spins
- Electromagnetic moments
- Mean-square charge

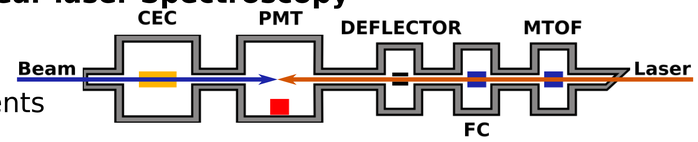


Fig.3: Details of the IGISOL collinear line

JYFL Penning trap

- High precision mass measurment
- Direct measurement of production yield of ^{229}Th

[7] Pohjalainen, I. et al., Nucl. Instr. Meth. Phys. Res. Sect. B, 376 (2016) 233-239.
[8] Tomita, H. et al., Prog. Nucl. Sci. tech., 5 (2018).
[9] De Groote, R. P. et al. Nucl. Instr. Meth. Phys. Res. Sect. B, 463 (2020) 437-440.

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