



Contribution ID: 9

Type: Poster

## Ongoing progress of the MARA low-energy branch

*Tuesday, 18 September 2018 16:46 (1 minute)*

The MARA low-energy branch (MARA-LEB) [1,2] is a novel facility currently under development at the University of Jyväskylä. Its main focus will be the study of ground-state properties of exotic proton-rich nuclei employing in-gas-cell and in-gas-jet resonance ionisation spectroscopy, and mass measurements of nuclei at the  $N=Z$  line of particular interest to the astrophysical rp process.

MARA-LEB will combine the MARA vacuum-mode mass separator [3] with a gas cell, an ion guide system and a dipole mass separator for stopping, thermalising and transporting reaction products to the experimental stations. The gas cell is based on a concept developed at KU Leuven [4] and designed for the REGLIS facility, GANIL. It will be able to use both Ar and He buffer gases to allow for more efficient neutralisation or faster extraction times respectively.

Laser ionisation will be possible either in the gas cell or in the gas jet using a dedicated Ti:Sapphire laser system. Following extraction from the cell the ions will be transferred by radiofrequency ion guides and accelerated towards a magnetic dipole for further mass separation before transportation to the experimental setups. The mass selectivity of MARA, combined with the elemental selectivity achieved through laser ionisation, will open the way to the study of nuclei with production cross-sections several orders of magnitude smaller than isobars produced in the same nuclear reaction. For example, isotopes at or close to the  $N=Z$  line, e.g. light Ag and Sn isotopes, will be of key interest.

A radiofrequency quadrupole cooler and buncher and an MR-TOF-MS [5] will be combined with the facility. These devices, which will be developed in Jyväskylä, will allow for mass measurements of several isotopes close to the  $N=Z$  line, and will provide significant information on the rp process and will be used as test grounds for nuclear models.

In this presentation we will give an update of the current status of the MARA-LEB facility.

### References:

- [1] P. Papadakis et al., *Hyperfine Interact* 237:152 (2016)
- [2] P. Papadakis et al., *International Conference on Ion Sources 2017*, AIP conference proceedings, article in press.
- [3] J. Sarén, PhD thesis, University of Jyväskylä (2011)
- [4] Yu. Kudryavtsev et al., *Nucl. Instr. and Meth. B* 376, 345 (2016)
- [5] R.N. Wolf et al., *Nucl. Instr. and Meth. A* 686, 82 (2012)

**Primary authors:** Dr PAPADAKIS, Philippos (University of Liverpool (GB)); Mr LIIMATAINEN, Jarkko (University of Jyväskylä); MOORE, Iain (University of Jyväskylä); Mr PARTANEN, Jari (University of Jyväskylä); POHJALAINEN, Ilkka (University of Jyväskylä); SAREN, Jan (University of Jyväskylä); Mr TUUNANEN, Juha (University of Jyväskylä); Dr UUSITALO, Juha (University of Jyväskylä)

**Presenter:** MOORE, Iain (University of Jyväskylä)

**Session Classification:** Poster Session 2

**Track Classification:** Ion guide, gas catcher, and beam manipulation techniques