DEVELOPMENT OF THE MARA-LEB FACILITY

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MARA-LEB (Mass Analysing Recoil Apparatus - Low Energy Branch) is a facility currently in the final stages of design as an extension to the MARA separator at the Accelerator Laboratory of the University of Jyväskylä [1]. The aim of this new facility is to study exotic ions close to the proton drip line and the region near the N=Z=50 doubly-magic shell closure. This region, which includes the heaviest self-conjugate ions, such as ^{80}Zr, ^{94}Ag and ^{100}Sn, is optimal for the testing of nuclear models and their predictions [2]. In addition to this, because many nuclei play a significant role in the astrophysical rapid proton (rp) capture process, this region of the nuclear chart is of importance in astrophysical nucleosynthesis models [3].

The combination with the existing MARA facility is ideal due to the high mass selectivity of the separator [4]. Mass-selected recoils from MARA enter the first part of the facility, the gas cell, through a thin window that separates a buffer gas region from MARA's high-vacuum environment. Incoming recoils will be stopped and neutralised by a buffer gas within the cell. The neutralisation of the recoils allows for subsequent in-gas-cell or in-gas-jet laser ionisation and spectroscopy via a state-of-the-art Ti:Sapphire laser system [5].

The ions emerging from the gas cell will be transported and focused towards the experimental stations by the MARA-LEB ion transport system [6]. This will be achieved by a 90º-bent radio-frequency quadrupole (RFQ), followed by a straight, segmented RFQ, which will transport the ions to acceleration electrodes. These will accelerate the ions to 30 keV and feed them into a magnetic dipole which will provide further mass separation for contaminant suppression.

A recent experiment has been carried out using the MARA separator to investigate the production of isotopes in MARA-LEB's region of interest close to ^{96}Ag. The charge state distribution of ^{96}Pd recoils at the focal plane of MARA will help to finalise design aspects concerning the size of the gas cell window. In this contribution, a general overview of the MARA-LEB facility along with preliminary results of the experiment will be given.

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