Contribution ID: **72** Contribution code: **NAT-2** Type: **Oral Presentation**

ALIS: The new infrastructure for low-energy isobar suppression at CologneAMS

Monday, 21 October 2024 11:10 (20 minutes)

The integration of a unique low-energy isobar suppression unit, the Anion Laser Isobar Separator (ALIS), marks a significant extension to the CologneAMS infrastructure. After the successful test of the advanced gas-filled radio frequency quadrupole (RFQ) ion cooler at the Vienna test bench, we present insights from first benchmark tests conducted at ALIS.

ALIS consists of three major sections. 1) Anion beam formation and mass selection, 2) Anion cooling and isobar suppression and 3) ion-beam transport to the 6 MV AMS system.
The first section uses a 134 sample MC-SNICS NEC ion source followed by a 90°-bending magnet. This allows to superimpose the ion beam with a high-power laser beam, that is required for isobar photo detachment. Analyzing slits are installed at the focal point of the magnet for mass selection, thereafter an einzel lens is used to focus the anions into the ion cooler. A pneumatic actuated beam attenuator is installed in between the ion source and the magnet for the attenuation of intense stable isotope beams.
The second section uses an advanced gas-filled radio-frequency quadrupole (RFQ) ion cooler with an elliptical deceleration electrode and hybrid RFQ-electrodes for ion confining and guiding.
The third section is designed to transport the anions to the existing beam line of the 6 MV AMS system and to match the ion-optical requirements. Consequently, the laser beam is separated from the ion beam, using a double focussing electrostatic analyzer (ESA) with an 8 mm hole in the outer spherical electrode. Because of the resulting field inhomogeneities induced by the hole, we have designed an additional spherical electrode that is able to correct for this effect.
In conclusion, we will report on the detailed design and status of ALIS and on the characterization of the system. Therefore, we present for example the anion extraction efficiency measurement for SrF_3^- and AlO^-, the total transmission measurement and the field homogeneity measurements of the ESA.
This project received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No. 824096.

Student Submission

No

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Session Classification: New and Advanced AMS Techniques

Track Classification: RFQ Ion Cooler Techniques