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Isotopenforschung und **Kernphysik**

E I N L A D U N G

zum

V E R A - S E M I N A R

von

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AMS of ^{36}Cl with the VERA 3 MV Tandem Accelerator

AMS of ^{36}Cl ($t_{1/2}$ = 0.30 Ma) at natural isotopic concentrations requires high particle energies for the separation from the stable isobar ^{36}S. Up to now, these energies were usually provided by tandem accelerators with terminal voltages > 5 MV. At VERA we have recently achieved ^{36}S suppression factors above 10^4 at 3 MV terminal voltage. We use terminal foil stripping and a detection setup consisting of a split-anode ionization chamber and a silicon strip detector. To further increase the ^{36}S suppression we investigated energy loss straggling in various counting gases and the effect of "energy focusing" below the maximum of the Bragg curve. Comparison of experimental data with simulations and published data showed how energy loss, energy straggling and angular scattering determine the ^{36}S suppression.

In addition, we improved ion source conditions, target backing materials, and the cathode design with respect to sulfur output and cross contamination. A thorough investigation of the memory effect of our ion source lead to a better understanding of our blank value. Currently it is ^{36}Cl/Cl $\approx 5\times10^{-16}$ if measured together with samples with a ratio of 10^{-12} or below, and ^{36}Cl/Cl $\approx 3\times10^{-15}$ when 10^{-11}-samples are used in the same sample wheel. We achieve an injector to detector efficiency for ^{36}Cl-ions of 8%. This comprises 16% stripping yield for the 7+ charge state in the accelerator and about 50% loss in the detection setup. We can now demonstrate that ^{36}Cl measurements at 3 MV terminal voltage are competitive to measurements at larger tandems.

Recently we started to explore the potential of selective laser-optical filtering of sulfur and chlorine by photodetachment directly in the ion source. First experiments in Gothenburg yielded surprising results. The aim of this talk is to present the advances in AMS of ^{36}Cl achieved over the last 2 years.

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