MS 12: Accelerator Mass Spectrometry and Applications III

Time: Thursday 14:00–15:00 Location: f128

MS 12.1 Thu 14:00 f128

Production of calcium and strontium hydride for negative ion beams — •Gereon Hackenberg, Alfred Dewald, Claus Müller-Gatermann, Markus Schiffer, Susan Herb, Karl-Oskar Zell, and Andrey Blazhev — Institut für Kernphysik, Universität zu Köln

There is a growing interest in AMS measurements of ^{41}Ca and ^{90}Sr isotopes. Whereas CaF_2 and SrF_2 are common sample materials for these isotopes, alternative cathode materials like CaH_2 or SrH_2 are of interest because of a potentially higher transmission through the accelerator.
The protocol for the sample preparation is well established and has been shown to yield high efficiencies for quantities in the 10 mg range of sample material. We tested these protocols also for sample quantities in the 1 mg range.
In this contribution we report on the results and the total yield of negative Ca and Sr beams and compare these values with fluoride samples.

MS 12.2 Thu 14:15 f128

Highly sensitive ^{26}Al measurements assisted by ILIAMS — •Johannes Lachner[1,2], Michael Kern[1], Oscar Marchhart[1], Martin Martschini[1], Alfred Priller[1], Peter Steier[1], Anton Wallner[2,3], Alexander Wieser[1], and Robin Golser[1] — [1]University of Vienna, Faculty of Physics, Austria — [2]HZDR, Dresden — [3]ANU, Canberra, Australia

The higher ion source output from Al_2O_3 for AlO^- compared to Al^- can improve the sensitivity of ^{26}Al AMS measurements. One obstacle is the more complicated isobar suppression after AlO^- extraction: For the metallic Al anion the ^{26}Mg background is suppressed in the ion scource. With ion-laser interaction mass spectrometry (ILIAMS), however, the ^{26}Mg isobar can also be completely suppressed for extracted AlO^- ions. This now allows the use of the more prolific AlO^- beam at facilities with terminal voltages < 10 MV.

At the 3 MV Vienna Environmental Research Accelerator (VERA) routine ILIAMS assisted AMS measurements of ^{26}Al are performed utilizing AlO^- and charge states 2^+ and 3^+ on the high-energy (HE) side of the spectrometer. Tests of Al_2O_3 mixtures with different metals were conducted to achieve the most efficient generation of AlO^- currents. Admixtures of Cu or Ag powder showed good results but were surpassed by mixing Al_2O_3 with Fe powder. In addition, results of first experiments will be presented regarding the utilization of ILIAMS assisted ^{26}Al measurements with lower terminal voltages and using the 1^+ charge state on the HE side.

MS 12.3 Thu 14:30 f128

Towards the redetermination of the halflife of ^{32}Si - Equilibrium charge distributions of ^{28}Si in Ar — •Matthias Schlomberg, Christof Vockenhuber, and Hans-Arno Synal — Laboratory of Ion Beam Physics, ETH Zurich

The long-lived radionuclide ^{32}Si is a cosmogenic nuclide with potentially interesting applications for dating the recent past. However, its half-life of about 150 years is still not known with sufficient precision despite several independent measurements over the four decades. The SINCHRON collaboration with partners from PSI, CHUV, PTB and ETH aims at a comprehensive redetermination of the half-life of ^{32}Si. Laboratory of Ion Beam Physics at ETH Zurich will perform the AMS measurements for the determination of the number of ^{32}Si atoms in the samples used for the activity measurement. In addition to the challenge of the separation of ^{32}Si from the isobar ^{32}S, the absolute measurement is challenging, because no ^{32}Si standards are available.

Therefore, the equilibrium charge state distribution of ^{28}Si in Ar was measured in the energy range of 1-40 MeV using the external stripper at the TANDEM AMS facility. This information is necessary to find the optimal terminal voltage and for correction of mass fractionation in the stripping process.

In the first part of the presentation, the SINCHRON project will be introduced and motivated. Subsequently, our setup to measure the equilibrium charge distribution will be shown and the obtained data will be presented and discussed.

MS 12.4 Thu 14:45 f128

Supernova-produced ^{53}Mn on Earth — •Gunther Korschinek[1], Thomas Faestermann[1], Mikhail Poutivtsev[2], Andres Arazi[3], Klaus Knie[4], Georg Rugel[5], and Anton Wallner[5] — [1]Physik-Department, Technische Universität München, 857 Garching, Germany — [2]DAW SE, 64372 Ober-Ramstadt, Germany — [3]Laboratorio TANDAR, Comision Nacional de Atomica, Av. Gral. Paz 1499, B1650KNA San Martin, Argentina — [4]GSI Helmholtz-Zentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany — [5]Helmholtz-Zentrum Dresden-Rossendorf, 01328 Dresden, Germany

For the age range from 1.5 to 4 Myr ago we found in deep ocean ferromanganese crusts an excess concentration in terms of ^{53}Mn/Mn of about $4 \cdot 10^{-14}$ over that expected for cosmogenic production. We conclude that this ^{53}Mn is of supernova origin because it is detected in the same time window, about 2.5 Myr ago, where ^{60}Fe has been found earlier. This overabundance confirms unambiguously the supernova (SN) origin of that ^{60}Fe. For the first time supernova-formed ^{53}Mn has been detected and it is the second positively verified radioisotope from the same supernovae. The ratio ^{53}Mn/^{60}Fe of about 12 is consistent with that expected for a SN with a 11 - 25 $M_\odot$ progenitor mass and solar metallicity. A fit over the whole range until 10 Myr shows also a second increase of ^{53}Mn/Mn in the range around 6 Myr matching recent ^{60}Fe detection in sediments at ANU.