MAT Science Week
April 24-27, 2018 at GSI, Darmstadt

Beitrag ID: **20** Typ: **Oral**

Detecting Beryllium-10 from exotic decays by Accelerator Mass Spectrometry (AMS)

Dienstag, 24. April 2018 14:20 (20 Minuten)

The one-neutron halo-nucleus Be-11 decays via beta-minus to the stable nucleus B-11 (t1/2=13.76 s). In rare cases a subsequent emission of a proton leads to the unstable nucleus 10Be. Theoretical calculations predict a branching ratio of this rare decay channel of below 1E-7. With the capability of AMS in measuring ultra-low isotopic ratios (Be-10/Be-9 < 1E-15) the branching ratio of beta-delayed proton decay to Be-10 could be measured for the first time.
A beam of Be-11 ions was produced at the radioactive ion beam facility ISOLDE at CERN. After mass separation the ions were implanted in Cu targets. These targets containing the produced Be-10 were spiked with low-level Be-9 and in the form of BeO chemically prepared as AMS targets at HZDR. The resulting Be-10/Be-9 ratios were determined via AMS at the VERA laboratory of the University of Vienna. With the known quantity of added Be-9 the amount of implanted Be-10 was calculated. Due to the low expected branching ratio and the resulting low number of implanted Be-10 atoms a high efficiency paired with a low background of the Be-9 carrier material was necessary.
To further widen the spectrum of radionuclides measureable by AMS and lowering the detection limits for similar nuclear physics research, we are planning to implement an optical filtering method for selective suppression of isobars by laser photodetachment (LISEL) at the 6 MV tandem accelerator at HZDR.

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Sitzung Einordnung: Mat Science Week

Track Klassifizierung: Annual Workshop on Ion and Particle Beams (Ionenstrahl Workshop)