MS 6 Präzisions-MS kurzlebiger Nuklide 2

Zeit: Donnerstag 10:40–11:40 Raum: H1

Hauptvortrag MS 6.1 Do 10:40 H1

Mass measurements around ^{147}Tm at SHIPTRAP — •Michael Block — GSI, Planckstrasse 1, 64291 Darmstadt

The determination of masses of rare radionuclides gives access to nuclear binding energies and is a useful tool supporting the understanding of the fundamental interactions in nuclei. At accelerator facilities worldwide measurements close to the limits of stability are pursued. Penning trap mass spectrometers have proven to be powerful tools for that purpose offering an unmatched precision combined with a high resolving power to identify isomeric states even with low excitation energies.

The Penning trap mass spectrometer SHIPTRAP at GSI was set up for precision mass measurements of heavy radionuclides produced in fusion reactions and separated by the velocity filter SHIP. This production scheme offers the unique possibility to access the region of elements heavier than uranium where only few masses have been experimentally determined up to now. The main challenge in this region is given by the low production rate of the interesting nuclides.

In first experiments the region of proton-rich rare earth nuclides near the proton drip-line was investigated. The nuclides were produced in the reaction ^{92}Mo(^{58}Ni,xpyn) at SHIP with primary beam energies between 4.36 to 4.6 MeV/u. In two runs the mass of 17 nuclides was measured including the ground state proton emitter ^{147}Tm with a half-live of 580 ms and its daughter ^{146}Er. Since the production rate of ^{147}Tm is only about a factor of ten higher than for nobelium, a mass measurement of nobelium is in reach.

MS 6.2 Do 11:10 H1

Extraction efficiency and the extraction times of the SHIPTRAP gas stopping cell — •Sergey Eliseev — GSI,Planckstrasse 1, 64291,Darmstadt

The SHIPTRAP stopping cell is a part of the SHIPTRAP mass spectrometer. Its good performance is critical for the overall efficiency of the spectrometer. For the investigation of the extraction efficiency and the extraction times of the SHIPTRAP stopping cell as well as for study of chemical processes taking place in the gas cell 219Rn recoil ions from the a-decay of a calibrated point-like 223Ra ion source were used. The extraction times were measured to be shorter than 10 ms at a helium gas pressure of 40 mbar. Thus, nuclides with half-lives as short as a few milliseconds are accessible for the various experiments planned at SHIPTRAP. Extraction efficiency of up to 30% at 50 mbar of helium gas pressure in the gas cell was obtained. The estimated total efficiency of the gas cell is about 10%, determined by the product of calculated stopping and measured extraction efficiency. Factors limiting the efficiency are quantitatively understood. Under proper conditions, ion-molecule reactions in the gas cell do not seem to limit the efficiency of the gas cell significantly.

MS 6.3 Do 11:25 H1

Systematic investigations at SHIPTRAP — •Ana Martin and SHIPTRAP collaboration — Planck 1, 64291 Darmstadt

Systematic investigations at SHIPTRAP - A. Martín for the SHIPTRAP collaboration GSI, Planckstrasse 1, D-64291 Darmstadt, Germany The ion-trap experiment SHIPTRAP at GSI Darmstadt was set up and commissioned to perform various precision experiments on heavy elements produced in fusion-evaporation reactions at SHIP. In the first stage SHIPTRAP focuses on high-precision mass measurements of exotic heavy nuclei with a Penning trap spectrometer. The results provide information for nuclear structure studies or to test astrophysical theories. Systematic investigations have been performed to determine the uncertainties of a mass measurement due to magnetic field fluctuations. These fluctuations were determined to be around 10E-9 per hour. The studies carried out at SHIPTRAP indicate that the magnetic field fluctuations are mainly given by the temperature variation, so a temperature stabilization system is being planned. In addition, magnetic field fluctuations due to changes of the helium pressure in the dewar of the superconducting coil are expected. To avoid problems with this remaining factor, a stabilization system for the pressure of the superconducting magnet is being developed too. Similar systems are already successfully used at SMILETRAP [1] and ISOLTRAP.

[1] ' SMILETRAP - A Penning trap facility for precision mas measurements using higly charged ions ', I. Bergström, C. Calberg, T. Fritioff, G. Douysset, J. Schönfelder and R. Schuch NIM A487, 618-651 (2002)