Tuesday, March 9th At 3:45 pm – Zoom mtg.

The NEXT Steps Towards the Outskirts of the Nuclear Landscape

Exotic nuclei far away of the valley of stability provide interesting insight into the evolution of nuclear structure as well as important input data for nuclear astrophysics. However, the production, separation, and preparation of short-lived isotopes for precision measurements are challenging. In our group, we develop new experimental techniques to tackle these challenges.

Within our CISE project, we want to prepare doubly magic Sn-100 and isotopes in its vicinity for Penning trap mass measurements. The acronym CISE stands for Chemical Isobaric Separation. We combine the thermalization step of nuclear fusion products in a gas-catcher with the separation step from un-wanted by-products. Gas-catchers are widely used in experimental nuclear physics to slow down for precision measurements. Chemical reactions inside the gas-catcher can be applied to separate the ions of interest. I will present our new setup to develop the chemical techniques and first investigations of the ion chemistry of tin, indium, cadmium and silver.

In the second part of my presentation, I will focus on our project NEXT-Neutron-rich Exotic nuclei produced in multi-nucleon Transfer reactions. Multi-nucleon transfer reactions using actinide targets hold the potential for the discovery of new isotopes in the transfermium region. These will provide access to information on the evolution of nuclear shell structure and fission half-lives in the heavy element region. Furthermore, transfer reactions with Xe-136 can provide access to isotopes along the N=126 shell closure, the 3rd waiting point of the astrophysical r-process. Due to the large angular distribution of the transfer products, sample preparation for mass measurements and decay spectroscopy studies remains challenging. Therefore, we are building a new experimental setup at the AGOR cyclotron facility at the University of Groningen. The new setup consists of a solenoid spectrometer combined with a Multi Reflection-Time of Flight Mass Spectrometer (MR-ToF MS). The solenoid spectrometer provides a large angular acceptance for transfer products. With help of the MR-ToF MS masses in the region around N=126 as well as neutron-rich transfermium isotopes will become accessible. I will present an overview of the project and its current status.

TEXAS A&M UNIVERSITY

CYCLOTRON COLLOQUIUM (Zoom Mtg)

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