



JINA-CEE
Center for the Evolution of the Elements

JINA-CEE Nuclear Astrophysics Research Seminar & Pizza Lunch

Monday, November 11 @ 12:30 PM
1400 BPS

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New approaches to astrophysical reactions with stable high-energy ion beams

High energy beams of stable nuclei are mostly used as a first step to produce beams of radioactive species. However, there are interesting applications based on the direct usage of the accelerated stable nuclei. We recently performed an experiment at GSI using O-16 beam at an energy of 500 AMeV. We observed the Coulomb breakup into C-12 and He-4 after interaction with a thin lead target. The idea is to constrain the astrophysically very interesting C-12(a,g) rate, which is the time-reversed reaction of the investigated Coulomb breakup. Ion storage rings offer new opportunities to investigate astrophysically interesting reaction in inverse kinematics. We performed proton capture experiments on stable Xe-124 in the energy regime of the gamma-process. The xenon ions were first accelerated to about 100 AMeV then fully stripped, injected into the Experimental Storage Ring at GSI. The actual measurement was performed after the ions were slowed down to 5-10 AMeV using a hydrogen droplet target. Fully stripped ions can have a significantly shorter beta-decay half-life than neutral atoms. The corresponding process is called bound-state beta decay. In the extreme case, nuclei, which are stable under terrestrial conditions, can beta-decay in the inner-most regions of stars. This process can be investigated with ion storage rings. I will review recent accomplishments using stable high-energy beams to infer astrophysically interesting reaction rates. In addition, I will share and discuss ideas for future experiments.

Pizza will be served at 12:30 p.m. in 1400 BPS