Contribution ID: **5** Type: **not specified**

Single particle spectroscopy of 133Sn via the (d,p) reaction in inverse kinematics

Friday, 16 July 2010 09:30 (30 minutes)

It is important, both for nuclear structure physics and understanding the synthesis of heavy elements in the cosmos, to determine how single-particle states change as we move away from the valley of stability, especially around shell closures. One powerful method to probe single-particle structure of nuclei is to use single-nucleon transfer reactions. With short-lived exotic nuclei, these reactions need to be performed in inverse kinematics, using a radioactive ion beam and light ion targets.
A beam of 132Sn produced at ORNLs Holifield Radioactive Ion Beam Facility was used in a transfer reaction experiment to study single-particle states in 133Sn. The beam impinged on a target of CD2 with effective thickness of around 150ug/cm2. Charged ejectiles were detected in an array of position sensitive silicon detectors, mostly of the new ORRUBA type, with SIDAR detectors at very backward angles. At forward laboratory angles, telescopes of detectors were used to discriminate protons from heavier, elastically scattered particles. From the angles and energies of the protons, the energies of the states populated in the final nuclei were measured.
The present work has determined the purity of the low-spin single-neutron excitations in 133Sn. A previously unobserved state in 133Sn has also been measured here for the first time. The simplicity of the structure of 132Sn, and the single-neutron excitations in 133Sn, provides a new touchstone needed for extrapolations to nuclei further from stability, in particular those responsible for the synthesis of the heaviest elements via the r-process.

Primary author: Dr JONES, Kate (University of Tennessee)

Presenter: Dr JONES, Kate (University of Tennessee)

Session Classification: Session 3: Experiments for r-process