Contribution ID: **46** Type: **Submitted**

Shape transition and coexistence in neutron-deficient rare earth nuclei: Coulomb excitation of 140Sm

Wednesday 19 December 2012 15:40 (20 minutes)

The open-shell nuclei with Z>50 and N<82 are predicted to have the largest ground-state deformation in the entire nuclear chart. The shapes are predicted to be prolate except for a small region of nuclei with Z>60 and N≈78, which are predicted to be oblate. Similar to the situation in Hg and Pb isotopes at neutron mid-shell, prolate and oblate shapes can be expected to lie close in energy for N=78 isotones at proton mid-shell. Calculations beyond the mean-field approach with the generator coordinate method predict shape coexistence and a transition from prolate to oblate ground-state shapes between 140Sm and 142Gd. We have performed a Coulomb excitation measurement with a 140Sm beam scattered on a 94Mo target in order to measure spectroscopic quadrupole moments for excited states and transition strengths between them. The ISOLDE facility has provided a quasi-pure beam of 140Sm with an average intensity of 2e5 particles per second in June/July 2012. At least three excited states in 140Sm were populated during the experiment: the 2+ and 4+ states of the ground-state band and a state at an excitation energy of 990 keV which is tentatively assigned as a second 0+ state. Such a low-lying excited 0+ state would support the predicted scenario of shape coexistence. The statistics collected during the experiment will allow analyzing differential Coulomb excitation cross sections as a function of scattering angle. Experimental details and first results from the experiment will be discussed.

Primary author: KLINTEFJORD, Malin (University of Oslo)

Co-authors: GOERGEN, Andreas (University of Oslo); LARSEN, Ann-Cecilie (EPF group-Department of Physics-University of Oslo); SIEBECK, Burkhard (University of Köln); RAPISARDA, Elisa (CERN); GIACOPPO, Francesca (University of Oslo (NO)); TVETEN, Gry Merete (University of Oslo); ZIELINSKA, Magdalena (CEA - Centre d'Etudes de Saclay (FR)); WARR, Nigel (University of Köln); HOFF, Per (University of Oslo); Prof. REITER, Peter (University Cologne, Nuclear Physics Institut); THOELE, Pierre (University of Köln); Dr SIEM, Sunniva (University of Oslo); TORNYI, Tamas (University of Debrecen); RENSTRØM, Therese (University of Oslo); KORTEN, Wolfram (CEA Saclay)

Presenter: GOERGEN, Andreas (University of Oslo)

Session Classification: Medium nuclei II