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Coulomb excitation of 140Sm

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The open-shell nuclei with Z>50 and N<82 are known to have some of the largest ground- state deformations in the nuclear chart. The shape of the nuclei in this region are expected to be prolate, except for a small island of nuclei with Z>62 and N≈78, which are predicted to be oblate. Nuclei near 140Sm are therefore expected to be located in a transitional region between deformed and spherical shapes (as a function of neutron number) and between prolate and oblate shapes (as a function of proton number), and shape coexistence may be expected to occur. Indeed, a low-lying excited 0+ state was tentatively assigned in 140Sm, which could be interpreted as a sign for shape coexistence. The measurement of spectroscopic quadrupole moments and transition strengths represents a sensitive test for theoretical predictions in this region. Due to the occurrence of two isomeric 10+ states of \pi(h_{11/2})ˆ2 and\nu(h_{11/2})ˆ{-2} $ configuration the lifetimes of low-lying states are completely unknown. A Coulomb excitation experiment with a 140Sm beam on a 94Mo target was performed at ISOLDE with the typical setup comprising Miniball and a DSSD in June/July 2012. The laser- ionized beam of 140Sm was quasi-pure with an average intensity of 2*10ˆ5 particles per second. At least three excited states in 140Sm were populated during the experiment: the 2+ and 4+ states of the ground-state band and the tentatively assigned 0+ state at 990 keV excitation energy. The statistics collected during the experiment allows the analysis of differential Coulomb excitation cross sections as a function of scattering angle. Experimental details and first preliminary results obtained in the analysis with GOSIA2 will be discussed.

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