Contribution ID: **32** Type: **poster with financial aid**

Shape coexistence in the neutron-deficient lead region

Since isotope shift measurements [1] first observed a sharp shape transition in the ground states of light odd-mass mercury isotopes, shape coexistence has been an actively studied phenomenon by means of in-beam spectroscopy. In light even mass mercury isotopes a weakly deformed oblate ground state band (β2≈-0.15) is found to coexist with a more deformed (β2≈0.25) prolate band. The prolate states are associated with the excitation of four protons across the Z=82 shell gap into the h9/2 and f7/2 (π(4p-6h) configuration) while oblate states are associated with the π(0p-2h) configuration [2,3]. There now exists a large body of evidence supporting the coexistence of different shapes at low excitation energies in mercury isotopes.

Coulomb excitation at safe energies serves as a vigorous technique to investigate the magnitude of transitions between low-lying states, revealing information on the mixing of the different bands. Pure beams of 182,184,186,188Hg were delivered by the ISOLDE radioactive beam facility to a stable Cd target (112Cd or 114Cd) placed in the middle of the MINIBALL gamma spectrometer to induce Coulomb excitation. The isotopes of interest were produced with 1.4 GeV protons from the PS booster impinging upon a molten lead target. The nuclei were charge bred in EBIS to charge states of 44+ (182,184,186Hg) and 45+ (188Hg). The intensities at the cadmium target were 4.9 x 103 pps (182Hg), 1.0 x 105 pps (184Hg), 2.5 x 105 pps (186Hg) and 3.1 x 105 pps (188Hg). These intensities were sufficient for the detection of low-lying, low-spin states. Observed deexcitation rates, together with known lifetimes [4-6] enable the transitional quadrupole matrix elements connecting different states to be extracted. Also the sign of the diagonal matrix element of the first excited 2+ state, containing the information about the nuclear quadrupole deformation, will experimentally be determined. In addition to the decay of the first 2+ state, transitions from the second 2+ state and from the first 4+ state have been observed during the experiment.
Analysis is in progress to measure the E2 matrix elements for the lower states in these nuclei. An experiment aiming at measuring lifetimes very precisely in 184,186,188Hg has been approved and scheduled at Argonne National Laboratory. Also an experiment at JYFL will attempt to measure E0 matrix elements in the nuclei of interest. The evolution of band mixing and deformation throughout the 184,186,188Hg isotope chain will be investigated to enhance our understanding about the shape coexistence phenomenon in this part of the nuclear landscape.

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Track Classification: Shell structure far from stability