Probing collectivity in the vicinity of neutron deficient Pb nuclei

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Nuclei around the neutron mid-shell at $N = 104$ in the vicinity of light Pb nuclei exhibit the phenomenon of shape coexistence where almost degenerate states of different shapes lie low in excitation energy. Collective excitations in this region of nuclear chart have been an active field of experimental and theoretival studies [1]. Recent lifetime measurements of excited states in ^{186,188}Pb and ^{194}Po have established a quadrupole collective character of yrast states and shed new light on configuration mixing of different shapes in these nuclei [2]. To study further the collectivity and mixing in this region, a series of Recoil Distance Doppler-Shift (RDDS) lifetime measurements have been carried out at the Accelerator Laboratory of the University of Jyväskylä employing the Köln plunger device and JUROGAM Ge-detector array coupled to RITU recoil separator [3].

In ^{196}Po, where intruder structures lie higher in energy than those in ^{194}Po, the lifetimes of the two lowest yrast states have been measured. These measurements, for the first time, have probed the level of collectivity of near spherical states which are assumed to dominate yrast bands in heavier Po isotopes.

In light even-mass Hg nuclei, a weakly deformed oblate ground state band is found to coexist with a more deformed prolate band. When comparing kinematic moments of inertia of the prolate bands in neutron deficient even-mass Hg nuclei to those in Pb, striking similarities arise in terms of their shape and level of collectivity. However, a more direct measure of these quantities is obtained by level lifetimes. Therefore, RDDS lifetime measurements have been carried out for ^{180,182}Hg to establish the level of collectivity of the yrast bands and investigate the picture of shape coexistence in neutron deficient Pb region.

In these experiments, $B(E2)$ values, transition quadrupole moments and quadrupole deformation parameters have been extracted from the measured lifetimes. The results and their interpretation will be discussed.

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