Contribution ID: **38** Type: **Oral**

Shape coexistence in neutron deficient nuclei

Across the nuclear chart, many interesting and diverse phenomena arise through the interplay of single-particle motion, nucleon pairing and collectivity. One such phenomenon, known as shape coexistence, is defined as the presence of distinct nuclear shapes within the same nucleus and at similar energy [1]. Significant theoretical and experimental effort is taking place to explore this phenomenon in different mass regions, while it is suggested that it could manifest in most, if not all nuclei [2].

One of the more prominent regions where shape coexistence has been observed, is in neutron-deficient nuclei close to the neutron mid-shell at N=104 and the Z=82 magic number. A broad range of experimental approaches including laser spectroscopy, α-decay fine structure measurements, in-beam γ-ray and conversion electron spectroscopy, lifetime measurements and Coulomb excitation experiments have been employed to study this phenomenon in detail.

In this presentation, we will explore some of these techniques, focusing primarily on simultaneous in-beam γ-ray and conversion electron spectroscopy [3], that has been instrumental in recent years in the study of shape coexistence in lead nuclei [4-8]. To demonstrate its effectiveness we will discuss some of the latest findings in particular in even-even lead isotopes.

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Track Classification: Nuclear Structure Studies