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Studying shape coexistence in the neutron-deficient lead region with few-nucleon transfer reactions

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In the atomic nucleus, the interplay between single-particle motion, collectivity and pairing is seen as a rich tapestry of shape coexisting states and exotic excitations, often associated with so called intruder states. One region where this shape coexistence phenomenon is especially prevalent is in the very neutron-deficient nuclei close to Z=82 with a neutron number close to the mid-shell of N=104. Whilst a plethora of spectroscopic techniques have been developed to study this phenomenon, the one technique yet to be employed is transfer reactions. Recent developments of HIE-ISOLDE, with the availability of significantly higher beam energies, provides a perfect opportunity to employ transfer measurements on the highly exotic beam species available. This coupled with the new ISOLDE Solenoidal Spectrometer and the existing Miniball and T-REX setup, provides a strong opportunity to use transfer measurements to shed some light on the shape coexistence phenomenon. Here we present an overview of the physics case and prospective initial measurements following on from LS2.

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