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In-source laser spectroscopy @ ISOLDE: studies of shape coexistence and shape evolution across the lead region

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Laser spectroscopy is a powerful tool for studying how structures of ground and isomeric states evolve across the chart of nuclides [1]. By measuring isotope shifts and hyperfine structures we can deduce fundamental properties such as nuclear spins, changes in mean-squared charge radii and electromagnetic moments, all in a model-independent way. Such data are excellent tests for theory, providing wide-ranging benchmarks to compare model predictions to [2].

I will introduce the in-source resonance ionisation technique used at CERN's ISOLDE facility [3] – a highly efficient method, which when combined with the sensitivity of decay stations [4] or mass spectrometry devices [5], allows access to exotic nuclides with extremely low production rates. Results will be presented from campaigns of experiments of isotopes in the proton-rich Pb (Z=82) region, a hot bed of nuclear structure phenomena that produce striking changes in nuclear ground-state deformation. Highlights will be given from studies of the charge radii of gold and bismuth isotopes, along with accompanying Hartree-Fock-Bogoliubov calculations that attempt to describe the trends in radii throughout the region [6].

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