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In-source laser spectroscopy at ISOLDE –revealing peaks and plateaus in nuclear charge radii in the lead region

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Laser spectroscopy is a powerful tool for studying fundamental nuclear properties. By observing small changes in atomic transitions, we can deduce the spins, changes in mean-squared charge radii and the electromagnetic moments of ground and isomeric states across long chains of isotopes. This allows for wide ranging studies to be conducted of how structures evolve across the nuclear chart.

The in-source resonance ionisation technique is a highly efficient method, which when combined with the sensitivity of radiation detection systems such as the ISOLDE Decay Station (IDS) and mass spectrometry devices like the MR TOF MS of ISOLTRAP, allows access to exotic nuclides with extremely low production rates. Over the past decade an extensive campaign has been conducted studying the structures of neutron-deficient isotopes near Z=82 –a region that has proven to be a hotbed of nuclear shape phenomena. Highlights will be given from recent studies of gold and bismuth isotopes, along with prospects for future in-source studies exploiting recent developments in ion source design.

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