Shape coexistence and fission in the lead region studied by in-source laser spectroscopy at RILIS-ISOLDE

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The competition between spherical and deformed nuclear shapes at low energy gives rise to shape coexistence in the region of the neutron-deficient lead isotopes with Z~82 and N~104 [1]. In order to determine to which extend the ground and/or isomeric states of those and neighboring nuclides are affected by this phenomenon, an extended campaign of investigation of changes in the mean-square charge radii is on-going at ISOLDE. By combining the high sensitivity of the in-source laser spectroscopy technique, ISOLDE mass separation and Windmill alpha-decay spectroscopy setup [2], it has been possible to study long isotopic chains of lead [3] and polonium [4], down to N=100 and N=107 respectively, and, recently, thallium isotopic chain down to N=98 [5], see Figure.

In this contribution, we will present the systematics of charge radii in thallium isotopes [5] together with the first preliminary results of the 2012 experimental campaign at ISOLDE to study charge radii in the long chains of the astatine and lightest gold isotopes [6]. In the gold and astatine cases, next to Faraday cup and Windmill measurements, also the Multi-Reflection Time-of-Flight (MR-ToF) mass separation technique [7] involving the ISOLTRAP collaboration was used.

In the second part of the talk, an overview of the recent beta-delayed fission studies at ISOLDE in the lead region will also be presented.

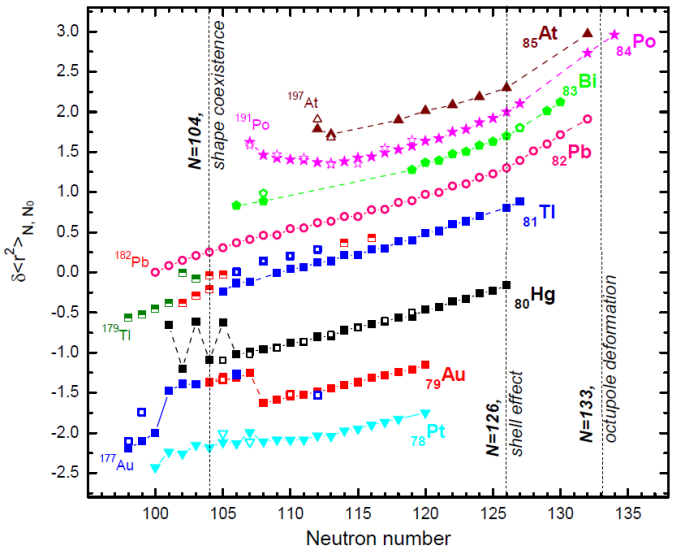

Figure. Charge radii for Pt-At isotopes. For the sake of clarity the data for different elements are shifted relative to each other by a vertical off-set. Tl data for the light isotopes are from ISOLDE [5] and Gatchina. Preliminary data for gold and astatine chains are from [6].

References

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