

Shape coexistence and charge radii in thallium, gold and astatine isotopes 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 [1]. In order to determine to which extent the ground and/or isomeric states of those and neighboring nuclides are affected by this phenomenon, a campaign of investigation of changes in the mean-square charge radii and electromagnetic moments 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 $N=98$.

In this contribution, we present the preliminary results of the charge radii, electromagnetic moments and spins measurements in thallium, gold and astatine isotopes. 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 [5] involving the ISOLTRAP collaboration was used.

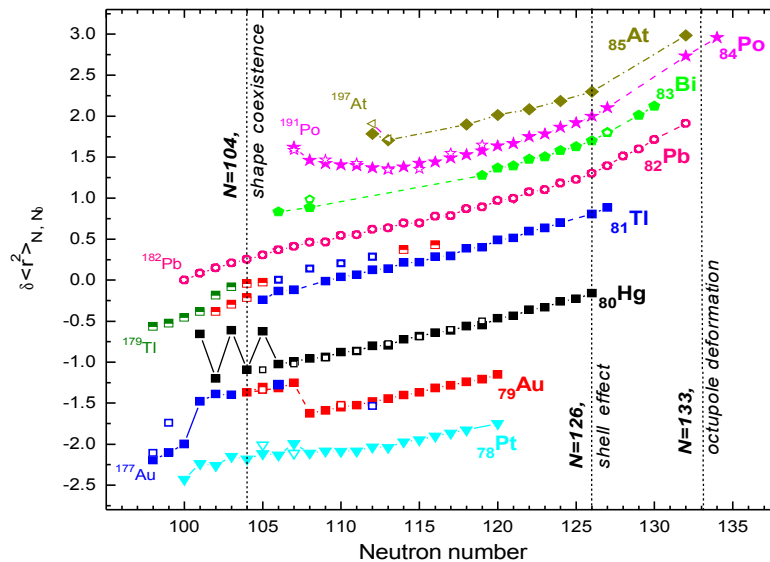


Figure 1: Charge radii for Pt-At isotopes. For the sake of clarity the data for different elements are shifted relative to each other by a vertical off-set.

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- [2] A.N. Andreyev et al., Phys. Rev. Lett., 105, 252502 (2010);
- [3] H. De Witte et al., Phys. Rev. Lett., 98, 112502 (2007);
- [4] T.E. Cocolios et al., Phys. Rev. Lett., 106, 052503 (2011);
- [5] R.N. Wolf et al., Nucl. Instr. and Meth. A 686, 82 (2012).