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# Probing the silver isotopic chain with mass- and laser spectroscopy

A campaign of measurements has been performed at the IGISOL facility, Accelerator Laboratory of Jyväskylä, exploring a long chain of silver isotopes resulting in measurements of charge radii, electromagnetic moments, spins, masses and excitation energies [1,2]. Different production mechanisms have been used, including fission, light- and heavy-ion fusion-evaporation. When combined with different experimental techniques, we have been able to probe the evolution of nuclear structure between the two neutron shell closures, N = 50 and N = 82.

Collinear laser spectroscopy has been performed on 113-123Ag, while in-source resonance ionization spectroscopy has explored neutron-deficient isotopes from 95Ag to 104Ag, crossing the N = 50 shell closure for the first time [3]. High-precision mass measurements across the same range of neutrons with the JYFLTRAP Penning trap mass spectrometer, combined with the laser spectroscopy data, allow for unambiguous ordering of nuclear states, with implications for earlier nuclear decay spectroscopy measurements. A new isomeric state was found in 118Ag and the atomic mass of 95Ag has been directly determined for the first time. The experimental data has provided stringent tests for theoretical calculations, including energy density functionals and state-of-the-art ab initio calculations [4].

Most recently, we have performed studies on the N = Z nucleus 94Ag, addressing a long-standing puzzle in the nature of the isomeric states, particularly the high-spin (21+) two-proton emitter. This achievement required a combination of all techniques available at the facility, resulting in almost background-free spectroscopy with rates below 1 ion every 10 minutes. The same methodology has also been applied to the neighboring N = Z 92Pd, and we keenly await the opportunity to apply our techniques to explore the doubly magic self-conjugate N = Z nucleus 100Sn in the coming years.

This presentation will summarize the results from this campaign and highlight future plans.

[1] R.P. de Groote et al., Phys. Lett. B 848 (2024) 138352.
[2] B. van den Borne et al., to be submitted (2024).
[3] M. Reponen et al., Nature Comm. 12 (2021) 4596.
[4] Z. Ge et al., Phys. Rev. Lett. 133 (2024) 132503.

## Notes

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