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Revealing the configuration of the K^\pi=8^- isomer in ^{254}No by in-gas-jet laser spectroscopy studies with JetRIS

The In-Gas Laser Ionization and Spectroscopy (IGLIS) technique is a powerful tool to study atomic and nuclear properties of short-lived actinides [2]. Such studies are important to understand the atomic level scheme of these heavy elements, strongly influenced by electron correlations and relativistic effects. Also, fundamental nuclear properties still unknown for most of these nuclei, such as moments, spins and differences in mean-square charge radii, can be determined independently of nuclear model assumptions. Thus, IGLIS studies provide experimental data that are crucial for testing and improving the predictions of state-of-the-art atomic and nuclear theoretical models.
The in-gas-Jet Resonance Ionization Spectroscopy (JetRIS) setup [1] has been designed to perform high-precision laser spectroscopy of heavy actinides in a collimated and low-temperature supersonic gas jet produced by a convergent-divergent contoured nozzle installed at the gas cell exit [2,3]. JetRIS has recently been commissioned at the focal plane of the SHIP spectrometer in GSI to perform laser spectroscopy on the 254No nuclear ground state [4], showing a six-fold improvement in spectral resolution with respect to conventional gas cell results obtained with RADRIS [5]. Combining an improved overall efficiency with a fast atom extraction, laser spectroscopy studies of the K^{\pi}=8^- isomer in ^{254}No (T_{1/2} = 265 ms) have been performed in a follow up online campaign. The obtained hyperfine structure has been used to extract the magnetic moment (gK-factor) providing a direct determination of the two quasi-particle configuration of the K-isomer and closing the long debate generated about the nature of this isomer from nuclear decay studies.
In this contribution we will present the nuclear moments and isomer shift of the K-isomer as well as the recent progress to improve the IGLIS technique.

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