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Recent results and upgrades from the 2024 CRIS campaign at ISOLDE

Friday 29 November 2024 14:00 (25 minutes)

For the last decade, the Collinear Resonance Ionization Spectropscopy (CRIS) experiment at ISOLDE has been focussing on performing laser spectroscopy for hyperfine structure studies of exotic nuclei across the nuclear chart. The CRIS technique allows to study atomic, nuclear and molecular properties and stands out with its combination of high-resolution measurements along a high sensitivity and efficiency. In recent years, experiments at CRIS have focussed on studying the atomic and nuclear structure across a range of elements, from as light as aluminium to as heavy as francium, investigating regions of shape coexistence, the island of inversion around $N = 20, 40$, the magicity of shell closures and in recent years also the structure of radioactive molecules such as RaF for beyond-standard-model investigations.

This talk will present the recent highlights from the 2024 CRIS experimental campaign, including the on-line campaigns on neutron-deficient gold isotopes in the "island of deformation" and shape coexistence, as well as the study of neutron-deficient antimony isotopes, with a single valence proton compared to tin ($Z = 50$), towards the $N = 50$ shell closure. Further experiments during the winter physics campaigns focus on studying the atomic structure of francium, in particular the $6D_{3/2,5/2}$ states, which are predicted to share a high sensitivity to new physics. The year at CRIS will end with investigations of negative RaF^-, and its potential for slowing and trapping for future precision measurements. With further on-line and off-line commissioning campaigns for new advancements in the technique, CRIS aims at enhancing its selectivity even further. Newest developments include the upgrade of the CRIS decay station for decay-based laser spectroscopy studies or decay spectroscopy studies after laser purification, and the installation of a field ionization unit for an additionally enhanced sensitivity of the method.

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