Recent results from laser spectroscopy at CRIS: towards more exotic isotopes and beyond nuclear structure studies

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In the last decade, the collinear resonance ionization spectroscopy (CRIS) technique [1,2] has proven to be a powerful tool for investigating atomic and nuclear properties of exotic nuclei across the nuclear chart [3,4,5]. CRIS stands out through its combination of conventional collinear laser spectroscopy with resonance ionization, enabling the extraction of high-resolution data on nuclear moments, mean-square charge radii, and the unambiguous determination of nuclear spins, even for isotopes produced at rates as low as a few tens of ions per second [6]. More recently, the CRIS experiment has also pioneered studies on short-lived radioactive molecules, in particular RaF, opening a new path for future beyond standard-model physics searches at low energies [7].

With the latest developments on the CRIS experiment at ISOLDE, CERN, the versatility of the technique has been further enhanced. Recent highlight cases will be presented, from challenging nuclear and atomic structure studies, to investigations of negative ions, including molecular anions such as RaF^-. The results and the methodological developments instrumental in achieving them will be discussed.

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