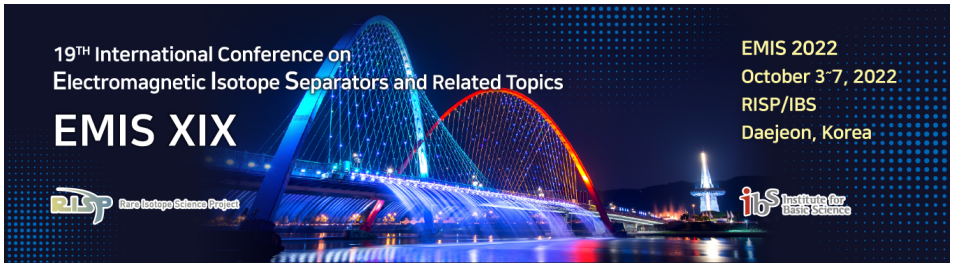

Contribution ID: **52** Type: **Oral Session**

Advances at the CRIS experiment for the laser spectroscopy of short-lived radioactive atoms and molecules

Monday, 3 October 2022 14:50 (20 minutes)

The collinear resonance ionization spectroscopy (CRIS) experiment at the ISOLDE facility at CERN specializes in performing high-sensitivity laser spectroscopy on species with production rates as low as 101-102 nuclei per second. Recently, thanks to the ability of the technique to perform both high-resolution spectroscopy at high precision and low-resolution spectroscopy with a short experimental runtime, the CRIS experiment has expanded its activities to include laser-spectroscopic campaigns on radioactive molecules.

Following the first laser spectroscopy of radium monofluoride (RaF) [1], further CRIS campaigns on beams of short-lived radioactive molecules are being envisioned. Actinium monofluoride (AcF) has been identified as a promising candidate system for the first measurement of a nuclear Schiff moment across the nuclear chart [2], and a CRIS experiment to pin down the electronic structure of AcF for the first time has been planned for the Fall of 2022.

Additionally, to further improve the performance of the CRIS experiment, a voltage-scanning setup has been recently installed, to combine the techniques of frequency and voltage scanning. Commissioning tests with stable beams of Al and Ag have demonstrated that combining the two scanning approaches can accelerate the experimental runtime by a factor of 4 while ensuring that alterations in the ion trajectories are minimized. Additionally, a new laser-ablation ion source based on a radiofrequency ion guide within a gas cell is under construction, aiming to improve the ability of the CRIS experiment to optimize the selection of a laser scheme for atomic and molecular studies.

This contribution will present the recently implemented and planned upgrades at CRIS along with recent results.

References

[1] R. F. Garcia Ruiz et al., Nature 581 (2020) 396-400.
[2] L. V. Skripnikov et al., Physical Chemistry Chemical Physics 22 (2020) 18374-18380.

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