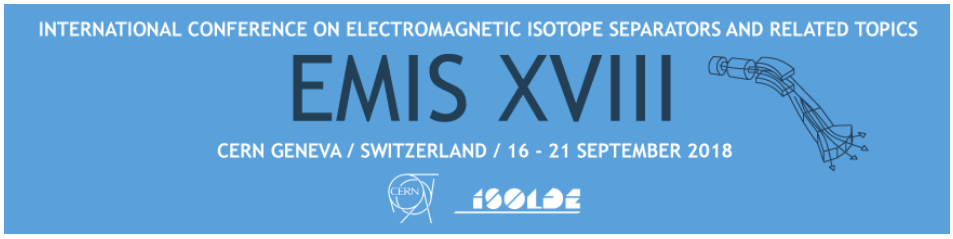

Contribution ID: **147** Type: **Invited**

Ionic, atomic and optical manipulation techniques at radioactive ion beam facilities

Tuesday, 18 September 2018 16:00 (30 minutes)

This contribution will present an overview of some of the most recent developments at radioactive ion beam facilities including methods to enhance the purity of ion beams both at the ion source, whether this be at an ISOL-type hot cavity facility or gas-cell-based facility, as well as the manipulation of beams prior to delivery to experimental setups. I will focus primarily on the application of laser techniques applied for purification (in-source, laser ion source trap methods, in-gas jet), but also how they may be used to gain an understanding of recently identified limitations in efficiency when one compares the application of similar resonant laser ionization schemes in gas cells vs hot cavity ion sources. This latter aspect becomes relevant in atomic systems with a high density of atomic levels, and I will use studies on the actinide elements and beyond as an example.

Further manipulation and "cleaning"of the ion beam is done using a combination of radiofrequency cooler-bunchers and traps. Other contributions to this conference include a variety of tools for low-energy purification, from Multi-Reflection Time-of-Flight devices, to novel phase-imaging cleaning applied in Penning traps. Optical manipulation in cooler-bunchers serves to move electronic state population into ionic levels which are more suited for laser spectroscopy, and such methods may be extended to resonantly ionize singly-charged ions for additional Z-selectivity. Extensions to optical manipulation may be found via polarization techniques, and in the near future this will be applied in combination with ion trapping for tests of Physics beyond the Standard Model. I will also present the status of new atom trapping applications at JYFL, which combine the selectivity of laser cooling and magneto-optical trapping to uniquely study isomeric or ground states. Such "cold atom"techniques are well known however are now being applied on-line to fission fragments for future applications.

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