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RILIS operation and development in 2023

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In line with the previous years, RILIS has been the favored ion source at ISOLDE in 2023, with more than 65% of the ion beams produced from April to November, including the winter physics program. In that period of time, more than 20 different elements were ionized using lasers at ISOLDE.

The stable operation of RILIS and fast switching in-between the elements was possible thanks to the constant effort in consolidating and developing the laser ionization technique. These developments concern both the laser capabilities and the ion source itself.

Concerning laser developments, the main axis of improvement aims to improve stability, output power, spectral coverage, and linewidth capabilities. Multiple projects have been conducted throughout the year, including the permanent installation of crystal ovens (stability), intra-cavity tripling (power/beamshape improvement in the UV range), Raman laser (spectral coverage –linewidth)···These developments were possible thanks to the refurbishment of a dedicated laser laboratory called LARIS.

Regarding the ion source, two main developments have been followed over the year. First, the LIST ion source is now a standard source at ISOLDE and has been used for several experiments over the year. Multiple improvements are ongoing to make it an even more versatile source in the future, especially for High-resolution Spectroscopy with the PI-LIST configuration. Secondly, developments toward a high-throughput laser ion source are ongoing in collaboration with SPES and SCK, with a common objective of tackling the ion load effect occurring in high-throughput operation configuration.

In terms of atomic and nuclear research, the team has dedicated 3 weeks of experiments at the beginning of the year to the spectroscopy and yield measurements of several Lanthanides (Dy, Pm, Tm, Er, Yb, Gd) and Actinides (Pu, Np), and finalized the development of a new laser ionization scheme for Cr.

This presentation will give an overview of operation, developments and research introduced above.

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