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Ion Sources for Radioactive Ion Beam Delivery at CERN-ISOLDE

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The ISOLDE radioactive ion beam facility is located at CERN's Proton Synchrotron Booster, where thick targets are irradiated with 1.4-GeV protons. Over 1000 different radioisotopes with half-lives down to milliseconds can be delivered to low-energy experimental setups at up to 60 keV, or post accelerated using the REX and HIE ISOLDE linear accelerators.

One important factor for planning experiments at ISOLDE and other RIB facilities alike is the yield or production rate of the desired isotope. When deciding on the target and ion source combination different aspects must be considered: the reaction cross-section for the isotope production in the target matrix, the diffusion and effusion properties of the element, and the optimal ionization mechanism. In addition to the absolute rate of a certain isotope of interest, the unwanted isobaric contaminants often must be addressed by choosing additional purification techniques. Examples are use of a neutron converter, quartz transfer lines, creation of radioactive molecules, or the use of the Laser Ion Source and Trap (LIST).

Here we will introduce the ISOL process and illustrate the aspects to be considered when selecting target and ion source combinations to optimize the yield and purity of the radioactive ion beam for the user. The ongoing and future ion source developments will be discussed and development facilities will be introduced.

Funding Agency

Email Address

sebastian.rothe@cern.ch

I have read the Code of Conduct to attend ICIS2023.

Yes

Presenter if not the submitter of this abstract

Sebastian Rothe

Primary author: ROTHE, Sebastian (CERN)

Presenter: ROTHE, Sebastian (CERN)