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The Cryogenic Stopping Cell of the IGISOL facility at ELI-NP

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The upcoming advancement of the ELI-NP project into its operational phase will offer to the nuclear physics community access to two new photon installations: a high-power laser system and a high-brilliance gamma beam system, which can be used together or separately.
One of the experimental setups proposed at the gamma beam system is an IGISOL facility [1] which will generate a Radioactive Isotope Beam (RIB) via photofission in a stack of actinide targets placed at the center of a Cryogenic Stopping Cell (CSC) coupled to a radio-frequency quadrupole for beam formation [2,3]. The CSC will use DC and RF electric fields to extract a RIB orthogonal to the primary beamline [4]. The exotic neutron-rich nuclei will be separated, and their mass measured, by a high-resolution Multiple-Reflection Time-of-Flight mass spectrometer. The isomerically pure RIBs will be measured by a β-decay tape station and a collinear laser spectroscopy station.
The latest developments in the simulation and design of the gas cell are presented. We report benchmark calculations of the production rates and of the extraction time and efficiency from the CSC. Starting from these studies, we discuss the optimal design of the cell and its state-of-the-art technologies.

1. D.L. Balabanski et al., Rom. Rep. Phys. 68, S621 (2016).
2. P. Constantin et al., Nucl. Inst. Meth. B 372, 78 (2016).
3. P. Constantin et al., Nucl. Inst. Meth. B 397, 1 (2017).
4. T. Dickel et al., Nucl. Inst. Meth. B 376, 216 (2016).

Selected session

Accelerators and Instrumentation

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