

The SPES RIB production system

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SPES (Selective Production of Exotic Species) is a project approved and financed by INFN aimed to produce neutron-rich Radioactive Ion Beams (RIBs) according to the ISOL technique. The core of the SPES facility, now in construction phase, is constituted by the TIS (Target - Ion Source) system that converts a stable proton beam into a RIB. The SPES production target is an innovative multi-foil direct target, composed of 7 UCx co-axial disks. The production target is impinged by a 40 MeV, 0.2 mA proton beam that generates approximately 1013 fissions per second. In the framework of the SPES project, two different kinds of ion source will be adopted: a Surface ion source (used for both surface and laser ionization), and a Plasma ion source. The SPES TIS system is installed inside a water-cooled vacuum chamber, and works approximately at 2000°C. High temperatures are fundamental to enhance the aforementioned diffusion-effusion processes, and to dissipate efficiently by thermal radiation the important amount of power deposited by the primary proton beam.

In this presentation, all the specific issues related to the SPES TIS complex will be appropriately presented and commented, showing the results obtained making use of both the theoretical and the experimental approaches. Also all SPES RIB systems, as laser systems, target-handling devices and the front end, they will be presented in detail, with an accurate description of the related experimental apparatus. A particular attention is dedicated also to safety issues that are of primary importance in the context of ISOL facilities.

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