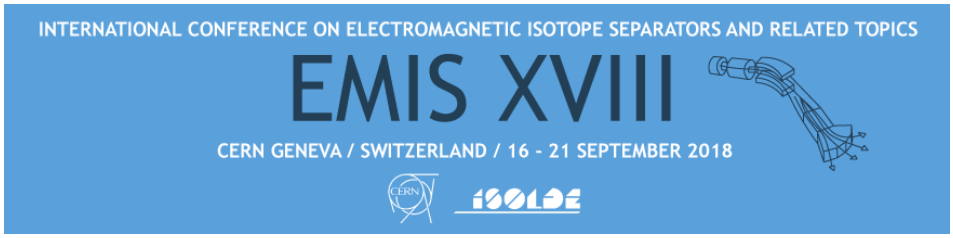

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High-power target development for the next-generation of ISOL facilities

Friday, 21 September 2018 09:00 (30 minutes)

The production of high purity radioactive ion beams (RIB) through the isotope separation online (ISOL) method makes possible unique research programmes in several fields of science. The demand for beam time continues to be high, while the study of more and more exotic isotopes, difficult to produce in sufficient quantities, is of primary interest for many of the currently defined research projects. At the same time, the growing interest from the medical field cannot pass unnoticed, the ISOL technique giving access to the most innovative medical isotopes, with extremely-high specific activity. Increasing the RIBs intensity is therefore of primary interest, and it is carefully addressed through several R&D programmes worldwide.
One of methods to increase the RIB intensity is by increasing the intensity of the primary beam on target. The ISAC facility at TRIUMF is capable to operate with high-intensity (up to 0.1 mA) 500-MeV proton beams, being the highest power ISOL facility under operation worldwide. To reach this level, composite target materials have been developed and integrated in a high-power target container capable of dissipating up to 20 kW through radiative cooling. Next-generation ISOL facilities plan to increase this power even further, which calls for innovative target designs. Such example is the LIEBE target (LIquid lEad Bismuth eutectic loop target for EURISOL), where, for the first time, the concept of a liquid target material circulating in a loop is being put forward. This loop-type target allows incorporation of a heat-exchanger for the necessary heat removal.
Similar or even exceeding heat-management challenges are to be faced by ISOL targets at high-intensity but lower-energy primary beam facilities. Examples are SPES and ISOL@MYRRHA-phase1, where, even if the primary-beam power doesn't exceed the level of the ISAC facility, the lower energy of the protons (40/70 MeV and 100 MeV, respectively) increases the power deposited into the target. The concept of these targets, therefore, departs from the concept of the high-power targets of ISAC.
Finally, the presentation will discuss high-power converter targets, used to produce secondary particles (e.g., neutrons) irradiating a fissile material. Dealing with the power deposition in the converter instead of the ISOL target represents an advantage. However, the design of this target system requires a detailed R&D for optimized RIB production.

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