The Proton Target Facility to be constructed in the first phase of MYRRHA

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Abstract

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.

The development of the accelerator driven system MYRRHA, at SCK•CEN, allowed elaborating the idea of a high-power ISOL facility capable to operate in parallel to the accelerator driven system (ADS) and making use of the same proton accelerator. In the operation scheme, about 5% of the CW proton beam of the 600-MeV 4-mA linac would be diverted towards the ISOL@MYRRHA facility with a frequency up to 250 Hz.

A phased implementation of the MYRRHA project was decided in 2015. Phase 1 involves the construction of the first part of the linac, providing 100 MeV proton beams to a Proton Target Facility (PTF) and a high-power beam dump used for testing the requested high reliability of the accelerator. After a detailed analysis of potential applications of the 100-MeV proton beam, ISOL@MYRRHA was selected to be implemented at PTF. In phase 1 this will be a major user of the up to 4-mA proton beam and the ISOL technology will be pushed to the maximum power level achievable. The R&D program, which started already in 2016, encompasses both the development of the technical-design solutions for the future facility, as well as the implementation of a physics-research program available at 100 MeV.

The presentation will provide information on the project and the ISOL-facility. The special case of Thorium-based ISOL targets operated at high beam intensity will addressed.