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Exploratory study for the production of Sc beams at the ISOL facility of MYRRHA

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The design of high-power targets for production of Radioactive Ion Beams (RIBs) at an Isotope Separation On-Line (ISOL) facility requires a full overview of the physical processes occurring in the target: nuclear reactions, thermal effects, isotope diffusion and effusion. Such high-power targets are nowadays a requisite as they constitute one of the means to significantly increase the yields of certain RIBs to the levels required by the users. In the first phase of the MYRRHA project, the ISOL@MYRRHA facility will make use of a high-power proton beam (100-MeV & 0.5 mA) in combination with high-power targets in order to produce high intensity RIBs of various isotopes. These high power targets require specific R&D to tackle engineering challenges like heat dissipation issues while maintaining the high isotope yields that are obtained with thick targets.
For this, an algorithmic method is in development that will combine the particle transport calculations, thermo-mechanical simulations, and an isotope release model, in order to determine the optimal target design for the production of a specific isotope. In this contribution, the exploratory study for the production of Sc beams at the ISOL facility of MYRRHA will be presented. The short lived isotopes like 41Sc would be of interest for beta-decay spectroscopy while the long lived ones like 44,47Sc are useful for medical applications.

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