

## Targets for the SPES project and its applications: material selection and release simulations

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The SPES (Selective Production of Exotic Species) ISOL facility at INFN-LNL will produce Radioactive Ion Beams (RIBs) by impinging a multi-foil uranium carbide target with a proton beam, accelerated up to 70 MeV by a cyclotron. The produced nuclei will be employed in many fields of research, ranging from astrophysics to material science and nuclear medicine. In order to increase the RIBs availability different target materials (i.e. SiC, TiC and ZrGe) are currently under investigation with Monte Carlo simulations using different codes for both isotopes production yield (FLUKA, GEANT4) and nuclear cross section studies (TALYS). Such materials were selected taking into account both the available proton beam energies and the expected working temperature (2000°C). In addition, the release from the target of the produced isotopes is under investigation through the definition of a new custom GEANT4 Monte Carlo model. Such a model is capable of simulating the nuclide diffusion and effusion processes, allowing the estimation of the mean release time for each produced specie. This work will include yield calculations for SiC, TiC, ZrGe and uranium carbide targets and a dedicated study of the nuclear cross section for the reaction  $\text{natGe}(p,X)^{64/67}\text{Cu}$ , a promising alternative for the production of copper nuclides of medical interest. Regarding the custom GEANT4 model some preliminary numerical results will be shown. In particular, the release of rubidium isotopes from the uranium carbide target was simulated at different working temperatures.

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