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Monte Carlo Simulations for the Future TATTOOS Target Station at PSI

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TATTOOS (Targeted Alpha Tumour Therapy and Other Oncological Solutions) is a proton irradiation target station to be built at PSI as part of the IMPACT project. The design goal of TATTOOS is to produce a wide range of radionuclides for diagnostics and therapeutics. Currently, UCx (Uranium Carbide) and Ta (Tantalum) targets are under investigation. Both the UCx and the Ta target will be irradiated by up to 100 μA , 590 MeV proton beam. A portion of the 2.4 mA high-energy proton beam extracted from the Ring Cyclotron HIPA will be directed towards the TATTOOS target, while the remainder will proceed to the muon production targets and the Swiss neutron source SINQ. Therefore, TATTOOS will be able to operate in parallel to the muon production targets and SINQ by the use of an electrostatic splitter.

TATTOOS encounters various design challenges, notably the management of high power density distributed onto the target and the large shielding required against intense neutron and gamma radiation fields. Addressing the 25 kW power deposit on the 300 cm³ target demands a bespoke cooling concept and innovative target design. Additionally, the confined space presents a formidable obstacle in devising shielding solutions for both the target station and the secondary ion extraction beamline.

In this paper, the Monte Carlo transport calculations for shielding and power deposition performed in support of the TATTOOS project will be presented.

Scientific Topic 1

Source terms, new accelerator facilities and related topics

Scientific Topic 2

Scientific Topic 3

Scientific Topic 4

Shielding and dosimetry

Scientific Topic 5

Scientific Topic 6

Scientific Topic 7

Scientific Topic 8

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