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## Radiation load studies for the proton target area of a multi-TeV muon collider

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Muon production in the multi-TeV muon collider studied by the International Muon Collider Collaboration is planned to be performed with a high-power proton beam interacting with a fixed target. The design of the target area comes with a set of challenges related to the radiation load to front-end equipment. The confinement of the emerging pions and muons requires very strong magnetic fields achievable only by superconducting solenoids, which are sensitive to heat load and long-term radiation damage. The latter concerns the ionizing dose in insulation, as well as the displacement damage in the superconductor. The magnet shielding design has to limit the heat deposition and ensure that the induced radiation damage is compatible with the operational lifetime of the muon production complex. Finally, the fraction of the primary beam passing through the target unimpeded poses a need for an extraction channel. In this study, we use the FLUKA Monte Carlo code to assess the radiation load to the solenoids, and we explore the possible spent proton beam extraction scenarios taking into account the constraints stemming from the beam characteristics and the required magnetic field strength.

### Footnotes

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