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Refined FLUKA simulation model of neutrino-induced effective dose from a multi-TeV muon collider

Tuesday 3 June 2025 16:00 (2 hours)

Most muons injected into a muon collider decay into an electron (or positron) and a neutrino-antineutrino pair, producing a narrow disk of high-energy neutrinos emitted tangentially to the beam in the collider plane. These neutrinos reach the Earth's surface at distances far away from the collider. Vertical diffusion of the neutrino cone, reducing integrated neutrino flux at any surface exit point, has been proposed as mitigation technique. This study presents effective dose calculations performed with the FLUKA Monte Carlo code for various geometrical models, each representing conservative radiation exposure scenarios from neutrino flux emerging from the ground at specific distances from muon decay points. These scenarios correspond to different parts of the muon collider ring: bending sections and long straight sections housing experiments. Results are provided as effective doses for annual exposure scenarios with a 100% occupancy. Two muon beam energies are considered: 1.5 TeV and 5 TeV, with a more detailed approach applied to the higher energy.

Footnotes

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LaTeX

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