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Lattice and detector studies for the MDI of a 10 TeV muon collider

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Among the possible future lepton colliders under study, circular muon colliders have the largest potential of reaching center-of-mass energies of 10+ TeV. Being more massive than electrons and positrons, muons are much less affected by synchrotron radiation emission, but they suffer from the drawback of having a limited lifetime. As a consequence of their decay, intense secondary radiation fields are generated in the collider, which can considerably disrupt the detector performance, both as physics background and as a cause of long-term material degradation. The machine-detector interface in a muon collider therefore requires a careful design, integrating massive shielding elements between the detector and final focus magnets. In this paper, we devise an interaction region design for a 10 TeV muon collider with a final focus triplet. We quantify the flux of secondary particles entering the detector by means of shower simulations and provide a first optimization of the shielding configuration. We also present first estimates of the power deposition and radiation damage in final focus magnets.

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Footnotes

On behalf of the International Muon Collider Collaboration

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Yes

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