

# Machine-detector interface design for a 10-TeV muon collider

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Circular muon colliders provide the prospect of colliding particles at unprecedented center-of-mass energies. However, the stored muons decay along their trajectory, inducing several technological challenges for the collider and detector design. In particular, secondary decay  $e^{+/-}$  are a source of background and induce radiation damage in the machine and detector components, requiring a sophisticated interaction region design. This paper presents design studies for the machine-detector interface (MDI) and quantifies the resulting beam-induced background for a 10 TeV muon collider with the latest optics design elaborated in the International Muon Collider Collaboration. Starting from the shielding design developed by the MAP collaboration for 3 TeV, we devise a customized MDI for the 10 TeV collider. In particular, we highlight the shielding requirements for the final focus magnets and a tentative nozzle optimization for minimizing the beam-induced background from the muon decay.

## Alternate track

1. Detectors for Future Facilities, R&D, Novel Techniques

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