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MUSIC: a detector concept for 10 TeV $\mu^+\mu^-$ collisions

The full exploitation of the physics potential of a multi-TeV muon collider will ultimately lie in the detector's ability to cope with unprecedented levels of machine-induced backgrounds.
This contribution introduces the MUSIC (MUon System for Interesting Collisions) detector concept and presents its performance in the context of $\sqrt{s} = 10$ TeV muon-antimuon collisions. The MUSIC detector is designed to mitigate machine-induced background effects while maintaining high efficiency and accuracy in the reconstruction of physics events, in particular in the Higgs boson sector and in the search for new physics. It features an advanced all-silicon tracking system, a semi-homogeneous lead-fluorite crystal electromagnetic calorimeter, a iron-scintillator sampling hadronic calorimeter, and a superconducting magnet providing a 5 T magnetic field.
The contribution presents the results of detailed detector simulations including the dominant machine-induced backgrounds. The results demonstrate promising tracking efficiency, photon, electron and jet reconstruction capabilities, and jet flavor identification performance, highlighting the strong potential of the detector for high-energy muon collider experiments.

Secondary track

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