

# Designing the muon system for a 10 TeV muon collider

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A 10 TeV muon collider is a promising machine for the high energy frontier. However, the beam-induced background (BIB), originated from the interaction of leptons from muon decay with the machine, represents a big challenge. To deal with its high occupancy, new reconstruction algorithms and high performance detectors are required.

In this context, the studies concerning the muon spectrometer are presented. A new geometry has been designed with seven (five) layers of Gas Electron Multipliers in the barrel (endcap) as track-sensitive chambers. In the endcaps, a layer of Picosec is added to provide time information to reject BIB hits. Picosec achieves resolutions of tens of picoseconds by amplifying, via a Micromegas, electrons from Cherenkov light produced from an incident particle on a radiator crystal. The results for the muon reconstruction efficiency and BIB mitigation are presented with the R&D outcomes with different radiators, photocathodes, and new-generation gas mixtures.

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