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Full detector simulation with unprecedented background occupancy at a Muon Collider

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In recent years a Muon Collider has attracted a lot of interest in the High-Energy Physics community thanks to its ability of achieving clean inter- action signatures at multi-TeV collision energies in the most cost-effective way. Estimation of the physics potential of such an experiment must take into account the impact of beam-induced background on the detector performance, which has to be carefully evaluated using full detector simulation. Tracing of all the back- ground particles entering the detector region in a single bunch crossing is out of reach for any realistic computing facility due to the unprecedented number of such particles. In order to make it feasible a number of optimisations have been applied to the detector simulation workflow.

This contribution presents an overview of the main characteristics of the beam-induced background at a Muon Collider, the detector technologies considered for the experiment and how they are taken into account to strongly reduce the number of irrelevant computations performed during the detector simulation. Special attention is dedicated to the optimisation of track reconstruction with the Conformal Tracking algorithm in this high-occupancy environment, which is the most computationally demand- ing part of event reconstruction.

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