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Accelerator Backgrounds in a Muon Collider

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Muon colliders are considered to be an important future energy frontier accelerator. It is possible to build a large muon collider as a circular machine, even at multi-TeV energies, due to the greatly reduced synchrotron radiation expected from muons. In addition to the same physics processes present in an electron collider, a muon collider will have the potential to produce s-channel resonances such as the various Higgs states at an enhanced rate. For a muon collider with 750 GeV/c μ+μ− with 2×1012 μ per bunch we would expect 8.6×105 muon decays per meter for the two beams. The energetic electrons from muon decays will produce detector backgrounds that can affect the physics. These backgrounds include electrons from muon decays, synchrotron radiation from the decay electrons, hadrons produced by photo-nuclear interactions, coherent and incoherent beam-beam pair production and Bethe-Heitler muon production. In this paper we will discuss these processes and calculate particle fluxes into the detector volume from these background processes.

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