

Mu2e: Tracker and Calorimeter Study in MARS
(with focus on geometry and simulation)

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Abstract

Mu2e is an experiment at Fermilab that will search for charged lepton flavor violation (CLFV) at an increasing sensitivity that will be able to probe energies as high as 10 000 TeV. The CLFV that will be sought is the neutrino-less conversion of a muon into an electron in the vicinity of an aluminum nucleus. This process is normally forbidden in the Standard Model of physics, yet discoveries since the development of the SM, and more, leads to more than one reason to point to theories beyond the Standard Model that account for CLFV, some of which have already been proven. The focus of this study is on the development of the tracker and calorimeter that will be used to detect the conversion electrons, specifically on the geometry and simulation in the MARS code. Geometrical models created with the purpose of ignoring backgrounds as much as possible, coupled with measuring particles momenta, trajectory, and end energy are the main strengths employed to detect our goal. Results are discussed and data given of a toy model simulation and a full model simulation in MARS.