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Mu2e Trigger & DAQ Design and Challenges

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The Mu2e experiment at Fermilab aims to measure the charged-lepton flavor violating neutrinoless conversion of a negative muon into an electron, producing a monochromatic electron with an energy slightly below the rest mass of the muon (104.97 MeV). We expect to set a limit on the ratio between the muon conversion and capture rate of 6.7×10^{-17} at 90% CL in three years of running using a pulsed μ^- beam that should provide $\sim 10^{18}$ stopped muons on an aluminum target.

A critical component of the experiment is the Trigger and Data Acquisition (TDAQ) subsystem. The TDAQ is responsible for collecting data from the detector subsystems, as well as generating and distributing timing information to synchronize the subsystems. The TDAQ also controls the operating modes for each event window, and provides monitoring and operator interfaces. Before delivering data to be processed offline, the TDAQ system must also provide online processing and filtering to achieve a rejection factor of 100 or more, resulting in approximately 7 Petabytes of data per year.

We present an overview of the TDAQ design and the progress of our development work as we seek to facilitate the accomplishment of our physics goals.

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