

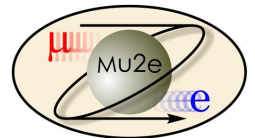


Enhancements and Deployment of the TDAQ System for the Mu2e Experiment

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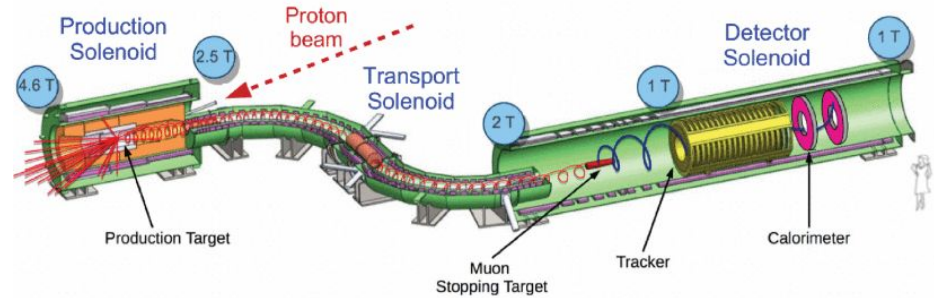
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Mu2e Experiment: Muon-to-electron conversion

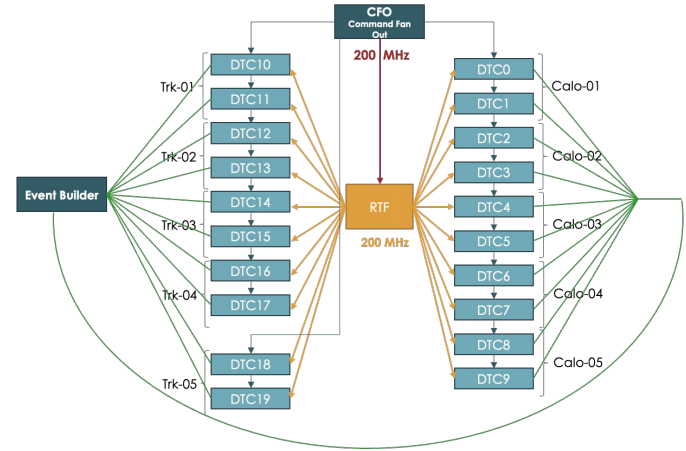
- Mu2e will search for the coherent neutrino-less conversion of a muon into an electron
 - Sensitivity improvement 10,000 times over previous experiments!
- Such a charged lepton flavor-violating reaction probes new physics
 - Will direct searches of present or future high-energy colliders



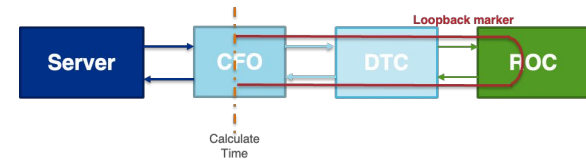
Not depicted in the diagram are the cosmic ray veto system, encircling the Detector Solenoid, and the muon stopping target.

Pre-production Deployment

- Trigger and Data Acquisition system integrates artdaq and art frameworks for event transfer, filtering and processing
- Data is read from the Data Transfer Controller (DTC) over PCIe
 - DTCs collect and process data, and perform event building
- Loopback tests measure marker round-trip time for event window synchronization
- All subsystems have been tested for event handling levels, responses to loopback markers, & signal injection timestamping
- RJ45 Timing Fanout (RTF) mitigates jitter accumulation with a 200MHz clock signal



High level configuration of the pre-production TDAQ system deployed at the Mu2e Experimental Hall.



Signals travel to different boards through fiber and cable of various lengths leading to asynchronous timing of event windows.

Questions?

References

A. Gioiosa et al., "Prototype Data Acquisition and Slow Control Systems for the Mu2e Experiment," in IEEE Transactions on Nuclear Science, vol. 68, no. 8, pp. 1862-1868, Aug. 2021, doi: 10.1109/TNS.2021.3094130.