The Mu2e experiment at Fermilab
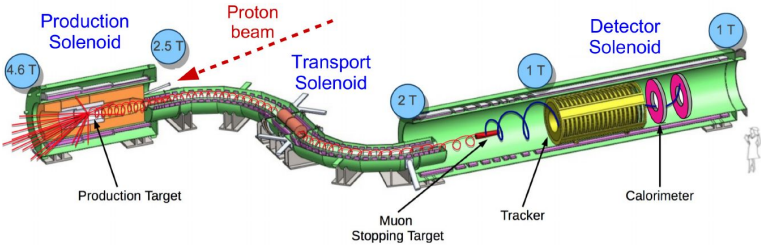
$$R_{\mu e} = \frac{\mu^- + A(Z,N) \rightarrow e^- + A(Z,N)}{\mu^- + A(Z,N) \rightarrow \nu_\mu + A(Z-1,N)}$$

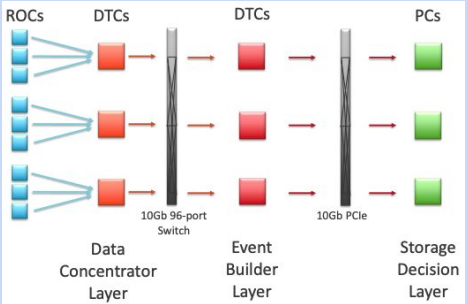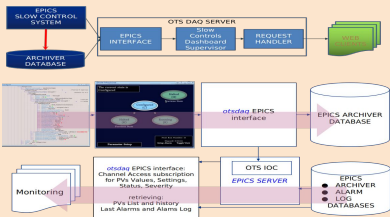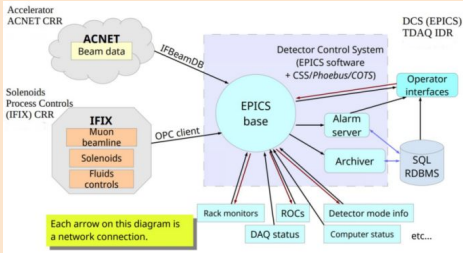The signal we are looking for is a delayed monoenergetic electron with an energy of just under 105 MeV (muon mass)

Production Solenoid — 4.6 T — 2.5 T
Proton beam
Transport Solenoid — 2 T
Detector Solenoid — 1 T — 1 T
Production Target
Muon Stopping Target
Tracker
Calorimeter

The Mu2e's Trigger and Data Acquisition System (TDAQ)

The TDAQ uses *otsdaq* as solution https://otsdaq.fnal.gov

- 396 Read-Out Controllers (ROCs)
- 69 Data Transfer Controllers (DTCs)
- 800 threads on 40 nodes for HLTrigger → ~5 ms x event
- ~40 GB/s data read out to storage decision layer
- ~280 MB/s written to disk

ROCs — DTCs — DTCs — PCs
10Gb 96-port Switch — 10Gb PCIe
Data Concentrator Layer — Event Builder Layer — Storage Decision Layer

The Detector Control System (DCS)

Experimental Physics and Industrial Control System (EPICS) has been chosen for DCS implementation

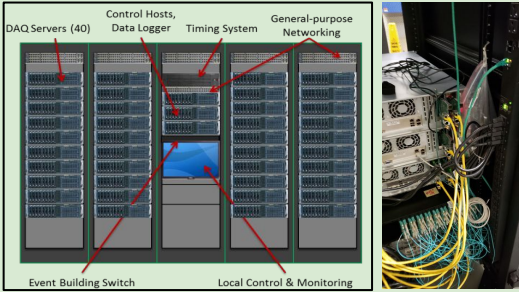*otsdaq* allows the user to monitor or interact with their own DAQ hardware and all other devices managed by EPICS

TDAQ and DCS installation in the Mu2e building

Last two year vertical and horizontal slice tests

- Characterization of synchronization and jitter
- Testing of DTC-ROC interface
- Trigger benchmarking

The installation plans
The racks, cabling, networking and controls are installed first, followed by the DAQ servers

DAQ Servers (40) — Control Hosts, Data Logger — Timing System — General-purpose Networking
Event Building Switch — Local Control & Monitoring

What is now ready in the DAQ room
General-Purpose Network; 12 DTCs nodes