



Contribution ID: 79

Type: **Poster**

Event Display Development for Mu2e using Eve-7

Tuesday 25 October 2022 11:00 (30 minutes)

The Mu2e experiment will search for the CLFV neutrinoless coherent conversion of muon to electron, in the field of an Aluminium nucleus. A custom offline event display has been developed for Mu2e using TEve, a ROOT based 3-D event visualisation framework. Event displays are crucial for monitoring and debugging during live data taking as well as for public outreach. A custom GUI allows event selection and navigation. Reconstructed data like the tracks, hits and clusters can be displayed within the detector geometries upon GUI request. True Monte Carlo trajectory of particles traversing the muon beam line, obtained directly from Geant4 can also be displayed. Tracks are coloured according to their particle ID and users can select the trajectories to be displayed. Reconstructed tracks are refined using a Kalman filter. The resulting tracks can be displayed alongside truth information, allowing visualisation of the track resolution. The user can remove/add data based on energy deposited in a detector or arrival time. This is a prototype and an online event display, is currently under-development using Eve-7 which allows remote access for live data taking and lets multiple users to simultaneously view and interact with the display.

References

Experiment context, if any

Mu2e is an upcoming experiment at the Fermilab. It will search for the Charged Lepton Flavour Violating process of neutrinoless, coherent conversion of muon to electron in the field of an Al nucleus. We develop a custom, sophisticated yet user friendly event display for the experiment that would be useful to the experts and amateurs.

Significance

An Event Display is the top layer of a robust framework, helping to visualise the physics in each event. They are crucial in the early planning stages of the experiment, for debugging of simulation and reconstruction codes, in detector calibration, physics analysis, online monitoring as well as for public outreach. We have developed a custom display for Mu2e using Eve-7. Art (Mu2e software framework) and Eve are both ROOT based frameworks which integrates the display well with the Mu2e environment, with full access to all Mu2e data products. A custom GUI has been developed for the display making it user friendly. It is also useful during analysis as the user can access all the event details through the ROOT Browser button available on the main window. Therefore, this is a sophisticated yet easy to use, bespoke display of Mu2e.

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Session Classification: Poster session with coffee break

Track Classification: Track 2: Data Analysis - Algorithms and Tools