Contribution ID: **95** Type: **Parallel talk**

Search for μ+ ⟶ e+e+e− at the Mu3e experiment and the Commissioning of the Pixel Tracker.

Wednesday 9 April 2025 12:15 (15 minutes)

The Mu3e experiment is dedicated to observing charged lepton flavour violation. This is observed through the neutrinoless decay of a muon to two positrons and an electron. The experiment is situated around the Compact Muon Beam Line (CMBL) at the Paul Scherrer Institut, which produces muons at a rate of 10E8 Hz. The experiment aims to observe the decay or exclude a branching ratio greater than 10E-16. To achieve this, there must be greater than 10E17 muons stopped in the detector. This detector must have a minimum reconstruction efficiency of 20%. The physical background for this decay is the Standard model approved decay with neutrinos. Our suppressible background comes from combinatorics. These sources of background must be suppressed to below the 10E-16 level. The first focus of this research is the pixel tracking detector of the experiment and understanding the effect the efficiency has on the physical output of the experiment. Initially, a tracking algorithm was used to measure and analyse the tracking and vertex reconstruction efficiency of the pixel detector. From this, an alternative tracking algorithm is used to identify inefficiencies in the detector and reconstruct tracks that would otherwise be missed. Mu3e is a high-intensity experiment and thus a high reconstruction efficiency is critical. By optimising both algorithms under realistic detector conditions, inefficient or noisy pixel sensors can be identified, and track reconstruction efficiency can be recovered. The results of these algorithms are presented. In addition to work on the efficiency of the pixel detector, a status of the University of Liverpool's contribution to the pixel sensor quality control is provided.

Author: KINSMAN, Charles (University of Liverpool)

Presenter: KINSMAN, Charles (University of Liverpool)

Session Classification: Analysis and Reconstruction Methods

Track Classification: Analysis and Reconstruction Methods