

## Status of Mu3e Phase 1

*Tuesday 22 August 2023 14:30 (30 minutes)*

The Mu3e experiment will search for the charged lepton flavour violating decay  $\mu \rightarrow e^+ e^- e^+$  and is based at the Paul Scherrer Institute (PSI). It aims to achieve a sensitivity of one in  $\mathcal{O}(10^{15})$  muon decays in phase 1 and one in  $10^{16}$  muon decays in phase 2, which is four orders of magnitude more sensitive than the previous measurement conducted by the SINDRUM experiment. Any observation of this decay would be a clear sign for new physics, since it is highly suppressed in the Standard Model to a branching ratio of below  $\mathcal{O}(10^{-54})$ .

The Mu3e detector will use four layers of thin Mupix sensors (high voltage monolithic active pixel sensors, HV-MAPS) to track electrons and positrons. A time resolution of  $\mathcal{O}(100\text{ps})$  will be provided by scintillating tile and fibre detectors, which are coupled to SiPMs and read out by the Mutrig chip. A FPGA-based, triggerless DAQ system will collect data from these detectors, which will then be reconstructed in a GPU filter farm.

With Mupix11 and Mutrig3 the sensor development for phase 1 has concluded and the collaboration has performed engineering runs with a first prototype of the inner detector region in order to validate a variety of systems and to identify potential issues. With the experience gained from the engineering runs the collaboration is now in the process of constructing the phase 1 detector.

The talk will present the design of the detector and readout system and discuss the ongoing activities for Mu3e phase 1.

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