

## The Mu3e experiment: status and short-term data taking plans

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Mu3e is an experiment under construction at the Paul Scherrer Institute in Switzerland, aiming to search for the lepton flavour violating decay:  $\mu^+ \rightarrow e^+e^+e^-$ . Any observation of this decay would indicate physics beyond the standard model (SM), as in the SM, neutrinos have no mass, and the decay is forbidden. Through extensions of the SM, the LFV decay becomes allowed through loops but is heavily suppressed  $O(10^{-50})$ . The sensitivity of Mu3e aims to be of  $O(10^{-16})$ , an improvement of four orders of magnitudes compared to previous results.

The experiment will use the world's most intense continuous muon beam, generating  $10^8$  muons per second in the first phase. These muons decay at rest after being stopped in a target placed at the centre of the detector. The entire detector will be placed within a 1 T magnetic field, such that after leaving the detector volume, charged particles return toward the detector and are detected a second time. While this also helps with background rejection, recurling is needed, especially for enhancing tracking resolution. Therefore, the Mu3e detector will be compact, with an extremely low material budget.

Additionally, to measure the missing energy and momentum carried by neutrinos (in the background process  $\mu^+ \rightarrow e^+e^+e^- \nu_e \bar{\nu}_\mu$ ), Mu3e will need very good momentum resolution ( $< 0.5$  MeV/c). The tracking is done through four layers of ultra-thin MuPix11 sensors. These are high-voltage monolithic active pixel sensors (HV-MAPS) with a  $\sim 23$   $\mu\text{m}$  spatial resolution. The timing will be done through scintillating fibres ( $\sim 250$  ps) and tiles ( $< 100$  ps), coupled to silicon photomultipliers and read out by MuTRiG3 ASICs. A triggerless DAQ system based on FPGAs will collect data from the detectors, which will then undergo reconstruction in a GPU filter farm. The assembly of the detectors has started, with an expected cosmic run scheduled for November and beam time next year. In this talk, I will report on the status of the installation and the data-taking plans for the near future.

### Working Group

WG 4: Muon Physics

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