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Searching for Lepton-Flavour Violation with the Mu3e Experiment

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The upcoming Mu3e experiment searches for the lepton-flavour violating decay $\mu^+ \rightarrow e^+e^-e^+$ with the aim of a final sensitivity of one signal decay in 10^{16} observed muon decays, an improvement over the preceding SINDRUM experiment of four orders of magnitude. In the first phase, the experiment will be operated at an existing intense muon beam line at the Paul-Scherrer Institute. With muon stopping rates of about 10^8 s^{-1} , a single-event sensitivity of $2 \cdot 10^{-15}$ can be achieved. For the ultimate sensitivity, a new high intensity muon beam line is required.

In order to suppress background, the tracking detector is designed to measure low momentum electron and positron tracks with excellent precision by making use of very thin silicon pixel sensors. In addition, scintillating fibres and tiles provide precise timing information.

Currently, the collaboration is finalizing the detector design and preparing for construction and commissioning.

The experimental concept with focus on the tracking detector will be outlined and the current status as well as recent simulation results will be presented.

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