

# Development and Commissioning of the Scintillating Fiber Detector for the Mu3e Experiment

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Noether Room, Staudingerweg 7, Building 2412, Room 03.423 (3<sup>rd</sup> floor – West)

The Mu3e experiment, currently under construction at the Paul Scherrer Institute, aims to probe charged lepton flavor violation through the search for the neutrinoless decay  $\mu^+ \rightarrow e^+e^+e^+$  using the world's most intense continuous muon beam. To achieve the required sensitivity of  $10^{-15}$  in its first phase, the experiment employs an ultra-thin detector design featuring High-Voltage Monolithic Active Pixel Sensors (HV-MAPS) for precise tracking, combined with scintillating fibers and tiles coupled to Silicon Photomultipliers (SiPMs) for precise timing. Suppression of combinatorial backgrounds necessitates a highly optimised scintillating fibre detector with a time resolution below 250 ps, spatial resolution below 100  $\mu\text{m}$ , and efficiency exceeding 96%. This talk will present the development, performance and the road-map for commissioning of the scintillating fibre detector.

**Marius Köppel:** “I am a PostDoc in Particle Physics at ETH Zurich, specialising in experimental particle physics, real-time data acquisition, and machine learning. I work on the Mu3e experiment, focusing on its scintillating fibre detector, and contribute to ML-based anomaly detection for the CMS experiment. My research aims to develop advanced solutions for processing the vast data generated by modern scientific experiments. Additionally, I am exploring muon spin spectroscopy with Si-Pixel detectors and studying algorithmic fairness as part of the TOPML project.”