

## Test Measurements with the Technical Prototype for the Mu3e Tile Detector

The Tile Detector is a dedicated timing detector system developed for the Mu3e experiment, which is designed to search for the lepton-flavour violating (LFV) decay  $\mu \rightarrow eee$  with a target sensitivity of  $10^{-16}$ . In order to determine the vertex of the three decay electrons, precise spatial and timing measurements are necessary, resulting in the requirement of a time resolution below 100 ps for the Tile Detector.

The Tile Detector, which is currently under development, employs plastic scintillator tiles and silicon photomultipliers, which are read out by dedicated 32-channel ASICs. Measurements using the first technical prototype of the Tile Detector in two testbeam campaigns, undertaken at the Deutsches Elektron-Synchrotron (DESY) in Hamburg, Germany in February and June 2018, show a preliminary single channel timing resolution of the order of 40 ps, which is well below the required resolution of 100 ps.

Furthermore, the production and assembly procedures for the final detector system were defined and finalised based on the experience gained from the construction of the prototype. Thermal simulation and measurement studies using the prototype provided additional input for the finalisation of the detector structure.

**Primary authors:** KLINGENMEYER, Hannah (Kirchhoff Institute for Physics, Heidelberg University); SCHULTZ--COULON, Hans-Christian (Ruprecht Karls Universitaet Heidelberg (DE)); Mr CHEN, Huangshan (Ruprecht-Karls-Universität Heidelberg); BRIGGL, Konrad (Heidelberg University); ZHONG, Tiancheng (Kirchhoff Institute for Physics); Dr SHEN, Wei (Heidelberg University, Kirchhoff Institute for Physics); MUNWES, Yonathan (Ruprecht Karls Universitaet Heidelberg (DE))

**Presenter:** KLINGENMEYER, Hannah (Kirchhoff Institute for Physics, Heidelberg University)

**Session Classification:** Poster Session B

**Track Classification:** Photon Detectors