

Development of a Timing Detector for the Mu3e Experiment

The *Mu3e* experiment is designed to search for lepton flavour violation through the $\mu^+ \rightarrow e^+ e^- e^+$ decay channel with a sensitivity of 1 in 10^{16} , thus improving by four orders of magnitude the present experimental limit. To achieve such precision we need highly granulated tracking detector complemented by an accurate timing system. The current work offers an introduction to the requirements of the experiment, followed by a discussion on the development of a timing sub-detector which is based on scintillating fibres readout by silicon photo-multipliers. We conclude by presenting the most recent prototype testing results.

Author: DAMYANOVA, Antoaneta (Universite de Geneve (CH))

Presenter: DAMYANOVA, Antoaneta (Universite de Geneve (CH))

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