



# detector seminar

SPEAKER: SCHOENING, A. (Ruprecht-Karls-Universitaet Heidelberg (DE))  
TITLE: **The Mu3e Experiment: A new search for muon  $\rightarrow$  eee with unprecedented sensitivity**  
DATE: Fri 31/03/2017 09:30  
PLACE: 40-S2-A01 - Salle Anderson

## ABSTRACT

The lepton flavor violating (LFV) decay  $\mu \rightarrow eee$  is highly suppressed in the Standard Model (SM) to an unobservable level. The observation of this or any other LFV decay would be a clear signal of physics beyond the SM. The Mu3e collaboration is preparing a new search and aiming to improve the experimental sensitivity by several orders of magnitudes with respect to the existing bound  $B(\mu \rightarrow eee) < 1E-12$  (90% CL) obtained by the SINDRUM experiment in the year 1988. The Mu3e experiment will be performed in two stages: In the first stage an existing beamline at the Paul Scherrer Institute (PSI) providing circa  $1E8$  muons per second will be used to reach a single event sensitivity of about 1 out of  $5E14$  events. In a second stage an ultimate sensitivity of  $B(\mu \rightarrow eee) < 1E-16$  (90% CL) could be reached by installing a new beamline providing more than  $2E9$  muons per second. The feasibility of such a High intensity Muon Beamline (HiMB) is currently studied at PSI. To suppress backgrounds a precise reconstruction of all muon decays is required. For track reconstruction an "all silicon pixel detector" based on High Voltage-Monolithic Active Pixel Sensors (HV-MAPS) will be used for the first time. The Mu3e detector will be complemented by fast timing detectors based on scintillating fibres and tiles with SiPM readout. The detector concept foresees to continuously readout all data and to reconstruct all muon decays in real-time on a filter farm implemented on GPUs. After introducing the experimental concept and detector design I will discuss the status of several detector developments and present testbeam results. Emphasis will be given on the design and construction of the pixel tracker which consists of ultra-light HV-MAPS modules with a radiation length of 1 per mile per tracking layer.

Organised by: Dominik Dannheim (EP-LCD)