Contribution ID: **62**   Type: **Poster**

Mighty Tracker - Performance Studies of the MightyPix for LHCb

A new downstream tracking system, known as the Mighty Tracker, is planned to be installed at LHCb during LS4. The reason for this is an increase in instantaneous luminosity from $2 \cdot 10^{33} \mathrm{cm}^{-2} \mathrm{s}^{-1}$ to $1.5 \cdot 10^{34} \mathrm{cm}^{-2} \mathrm{s}^{-1}$ and therefore an overall higher irradiation and up to six times higher occupancy.

To keep the material budget as low or even lower as for the current detector, the Mighty Tracker is planned as a hybrid system with silicon pixels in the inner and scintillating fibres in the outer region.

For the pixel detector part HV-CMOS MAPS with a pixel size of $55\mu\mathrm{m}$ x $165\mu\mathrm{m}$ will be used. This technology has been chosen because of its low production costs, low material budget, high radiation tolerance and good timing resolution.

To fulfill the requirements, the development and characterization of the sensors focuses on radiation damage with fluences up to $2 \cdot 10^{15} \mathrm{MeVn_{eq}/cm^2}$ and a timing resolution $\leq 3\mathrm{ns}$.

The timing resolution is restricted due to the 40MHz triggerless DAQ by LHCb.

To characterize and further develop the MightyPix, a new readout system called MARS (Mighty Tracker Readout System) has been developed in Bonn.

MARS is a modular system, able to test different single chips in the laboratory as well as at testbeam facilities. It has been used to perform first characterization studies of development-chips investigating radiation tolerance and timing resolution as well as the dependence of the sensor settings on the overall performance.

This presentation covers first results of ongoing characterization studies of HVCMOS-MAPS with the newly developed readout system and an introduction to this.

Submission declaration

Original and unplublished

Author: SCHMITZ, Hannah (University of Bonn (DE))

Co-authors: PADEKEN, Klaas (University of Bonn (DE)); NEUBERT, Sebastian (University of Bonn (DE))

Presenter: SCHMITZ, Hannah (University of Bonn (DE))

Track Classification: Detector concepts