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Silicon micro-strip detector response simulation for the CBM experiment

Summary

The Compressed Baryonic Matter experiment (CBM) at FAIR is designed to explore the QCD phase diagram in the region of high net-baryon densities. As the central detector component, the Silicon Tracking System (STS) is based on double-sided micro-strip sensors. To achieve realistic modelling, the response of the silicon strip sensors should be precisely included in the digitizer which simulates a complete chain of physical processes caused by charged particles traversing the detector, from charge creation in silicon to a digital output signal. The current implementation of the STS digitizer comprises non-uniform energy loss distributions (according to the Urban theory), thermal diffusion, Lorentz shift in magnetic field, charge redistribution over the read-out channels due to interstrip capacitances as well as the read-out chip modelling: threshold, noise, etc.
Using the digitizer, one can test influence of each physical processes on cluster and hit parameters separately. We have developed a new cluster position finding algorithm and a hit error estimation method for it. The errors were verified by the width of pull distributions (expected to be about unity) and their shape.

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