

The PixelGEM High-Rate Tracking System of COMPASS

For the COMPASS experiment at CERN a Gas Electron Multiplier (GEM) detector with a novel readout type has been developed. It combines a pixel read-out in the central part of the active area, exposed to the beam, with a projective strip readout in the periphery where the particle rate is lower ("PixelGEM"). This read-out structure provides precise spatial information for the tracking of charged particles even at high intensities of muon and hadron beams with a particle rate of more than $2 \cdot 10^5 / (mm^2 s)$. The low material budget of these detectors is essential in an effort to reduce the amount of multiple scattering and secondary interactions for data taking with hadron beams, replacing the scintillating fibre detectors previously used for the tracking in the beam centre and its close surrounding. The detectors will also be used in future muon beam times.

Extensive tests of prototype detectors in both muon and hadron beams yielded spatial resolutions of 90 μm and efficiencies above 99% at low intensities of $1.1 \cdot 10^6 \text{ mu/s}$, and stable operation of the detectors at particle rates as high as $1.2 \cdot 10^5 \text{ mu}/(mm^2 s)$. For the physics data taking with pion and proton beams in 2008/2009 five detectors were set up. The performance of the full PixelGEM tracking system will be presented.

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Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

http://www.e18.physik.tu-muenchen.de/~suhl/VCI2010_suhl.pdf

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