

Readout and Precision Calibration of square meter sized Micromegas Detectors using the Munich Cosmic Ray Facility

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Currently m^2 large Micromegas detectors with a spatial resolution better than $100 \mu m$ are of big interest for many experiments and applications.

The combination of large size and excellent spatial resolution requires highly sophisticated construction methods in order to fulfil tight mechanical tolerances.

We present a method to survey full sized micromegas detectors on potential detector deformations or deviations of the internal micro pattern structure from design values by comparing to precision reference tracking of cosmic muons.

The LMU Cosmic Ray Facility consists of two $8 m^2$ ATLAS MDT (monitored drift tube) chambers for precision muon reference tracking, as well as two segmented trigger hodoscopes for 10 cm position information along the wires of the MDTs with sub-ns time resolution.

The angular acceptance for cosmic muons is ± 30 degrees and its mechanical layout allows the installation of one or multiple Micromegas detectors in between the MDT reference chambers. Track segments reconstructed in all systems can be compared, allowing a full scan for efficiency homogeneity, pulse height, single plane angular resolution and spatial resolution, also as function of multiple scattering.

In addition to results on the performance of resistive strip Micromegas detectors of size up to $2 m^2$ we report on the synchronized electronic readout system, based on standard MDT electronics, together with custom electronics and firmware, based on the SRS Scalable Readout System.

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