Performance and Calibration of a 2m² SM2 Micromegas Detector for the **ATLAS Muon Spectrometer Upgrade**

The steadily increasing luminosity of LHC requires an upgrade to high rate capability and high resolution capable detector technologies for the innermost station of the muon spectrometer of the ATLAS experiment. For precision tracking 4 types of 2 and 3 m² large micromegas guadruplets will provide 8 consecutive active layers, each with 100 µm spatial resolution per individual plane.

Data taken at the 120 GeV SPS muon and pion beam in August 2017 on one 2 m² quadruplet prototype(SM2 built by the German consortium), show spatial resolutions of 80 µm for perpendicular particle incident using charge weighted position reconstruction. An analysis using additional drift-time information gives similar good resolution also for inclined tracks.

The full active area of the SM2 prototype quadruplet has been calibrated in the Munich Cosmic Ray Facility. A segmentation of the active area into 55x100 mm² partitions enabled a detailed full area analysis of local detector properties, as geometrical guality, efficiency and pulse height.









