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Construction of a large-size four plane micromegas detector

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In view of the use of micromegas detectors for the upgrade of the ATLAS muon system, we have constructed two detector quadruplets with an area of 0.5 m^2 per plane serving as prototypes for future ATLAS chambers. They are based on the resistive-strip technology and thus spark tolerant. The detectors were built in a modular way. The quadruplets consist of two double-sided readout panels with $128 \mu\text{m}$ high support pillars and three support (or drift) panels equipped with the micromesh and the drift electrode. The distance of the micromesh from the drift-electrode determines the drift (or conversion) gap. The panels are bolted together such that the detector can be opened and cleaned, if required. Each readout plane comprises 1024 strips with a pitch of 0.4 mm. Two of the readout planes are equipped with readout strips inclined by 1.5 degree. The quadruplet thus delivers track coordinates with a resolution of better than $100 \mu\text{m}$ in the precision coordinate and 1 mm in the second coordinate.

We will present the detector concept, our experience with the detector construction, and the evaluation of the detectors with cosmic rays and x-rays.

One of the quadruplets will be installed in ATLAS in summer 2014, equipped with the newly developed digital VMM readout chip.

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