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Studies on readout channel thresholds of resistive MicroMegas for ATLAS Muon Spectrometer

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ATLAS New Small Wheels upgrade project plans to replace the inner parts of the end-caps of ATLAS Muon Spectrometer with new mechanical structures equipped by a combination of small Thin Gap Chambers (sTGC) and resistive MicroMegas (MM) detectors. During the integration of detectors, the sTGC and MM are separately tested before to be assembled. On MM detectors, tests on the noise are performed together with measurements of tracking efficiency, exploiting the cosmic rays as incoming particles.

The MM readout channels are floating copper strips with different lengths, from 284.0 mm to 1990.0 mm (capacitively coupled with carbon strips at few hundreds V). Due to the wide strip length range, the strip capacitance affects the noise with different magnitude, leading a larger spread in the baseline along a tracking plane, respect to a configuration with same size strips. It also impacts the thresholds that are proportional to baseline rms, with a settable factor. Especially if the variations in thresholds is large among close strips on a tracking layer, it compromises the time measurements for the μ TPC procedure.

To uniform the thresholds on the plane, a single-channel level correction can be applied, by an implemented trimmer in the electronic boards (based on VMM ASIC).

Therefore, studies on the baseline and threshold were performed as function of the strip length.

After them, studies on the efficiency and cluster parameters were carried on as function of the thresholds. Their results will be presented.

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