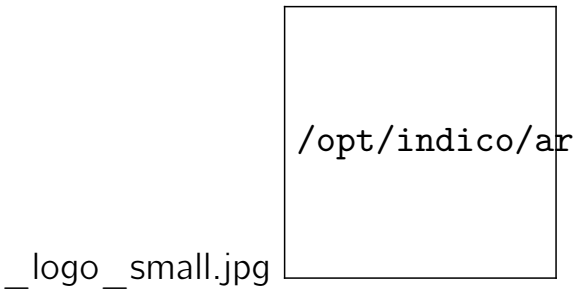

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Large Area Resistive Micromegas for the Upgrade of the ATLAS Muon Spectrometer

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Content

Large size resistive Micromegas (MM) detectors will be employed for the first time in high-energy physics experiments for the phase-1 Muon Spectrometer upgrade of the ATLAS experiment at CERN / LHC. The current innermost stations of the muon endcap system, the Small Wheel, will be upgraded in 2019 to retain the good precision tracking and trigger capabilities in the high background environment expected with the upcoming luminosity increase of the LHC. Along with the small-strip Thin Gap Chambers (sTGC) the "New Small Wheel" will be equipped with eight layers of MM detectors arranged in multilayers of two quadruplets, for a total of about 1200 m^2 detection planes. All quadruplets have trapezoidal shapes with surface areas between 2 and 3 m^2. The MM system will provide both trigger and tracking capabilities. A transverse momentum resolution of about 15% for 1 TeV muon is required, as a consequence, each MM plane must achieve a spatial resolution of the order of 100 μm independent of the track incidence angle. To keep systematics under control a challenging mechanical precision is required in the construction; the position of the readout elements (the strips) of the assembled module must be known with an accuracy of 30 μm along the precision coordinate and 80 μm perpendicular to the plane. The detector will operate in a very challenging environment: an inhomogeneous magnetic field (B $<$ 0.3 T), and a background rate up to ˜15 kHz/cm^2 In the recent years, the achievement of the required performance has been demonstrated with dedicated test-beams performed on small (10$\times$10 cm^2) resistive MM detectors. This talk will review all the work done to move from the small (with bulk technology) prototypes to the large final detector with the same resistive scheme but using a mechanical floating mesh. In May 2016 the first full size prototype (modules-0) has been completed and studied on a dedicated test beam at Cern, then used to perform mechanical studies for the detector assembly in the wheel and for the performances under deformation. Results of these tests will be shown.

Summary

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