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Performances of ATLAS Micromegas detectors in high background environment and after long term irradiation at the Gamma Irradiation Facility at CERN

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The ATLAS muon spectrometer will face an increase of particle rate consequently of the larger instantaneous luminosity for the high luminosity LHC phase (HL-LHC), expected to reach 7.5 x 10^34 cm^-2 s^-1.
Micromegas chambers are used in the New Small Wheel, the first end-cap muon spectrometer station, in order to provide good tracking and triggering performance at the intense particle rates expected in the end-cap of the ATLAS experiment.
The detectors are operated with Ar:CO2:iC4H10 93:5:2 vol% gas mixture, providing a
good HV stability and a large pulse height, useful for inclined track reconstruction.
Due to the hydrocarbon content in the mixture, an extensive long term irradiation campaign is ongoing at the Gamma Irradiation Facility at CERN, where spare production chambers are long term exposed to a 11.6 TBq 137Cs gamma source, accumulating so far a charge equivalent to several years of HL-LHC operations.
Several parameters have been studied to check the stability of the detector performances during and after the irradiation period, such as detector efficiency, tracking position and time resolution using the SPS H4 muon beam at CERN.
This contribution will describe the results obtained from the above studies, showing the good response of the detector after several 'HL-LHC equivalent' years of irradiation and demonstrating the robustness of ATLAS Micromegas detectors under intense particle rates.

Collaboration

ATLAS Muon

Role of Submitter

The presenter will be selected later by the Collaboration

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