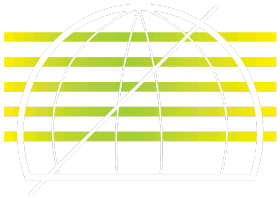

RPC 2022

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Exploring the performance limits of the new generation of ATLAS RPCs

Friday 30 September 2022 10:20 (20 minutes)

The new generation RPCs designed for the ATLAS upgrade, feature a gas gap of just 1 mm challenging the statistical detection limits of its gaseous target with MIPS, and a Front End (FE) electronics with 1-2 fC sensitivity challenging the grounding robustness on such large dimensions with respect to the signal frequency spectrum. This is necessary in order to respond to the performance request coming from the ATLAS upgrade needs, in terms of very limited space available and accessibility, longevity in the HL-LHC environment, requirement of maximum acceptance and efficiency, stand-alone muon selection capability, low power consumption.
The BIS78 Module zero chamber has been extensively tested with a muon beam and photons at the GIF++ facility of CERN, in order to establish the limits of this new technology, on a real case detector and in real working conditions, letting the RPC self triggering muon tracks on its whole surface, and comparing the results with an external trigger. The aim is to provide a realistic prediction for future experiments adopting this technology.
We will focus in particular on how the efficiency, time resolution and charge per count, depends on electric field in the gas and on FE threshold, with different background intensities and with R134A and HFO based gas mixtures.

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