

The BIS78 Resistive Plate Chambers upgrade of the ATLAS Muon Spectrometer for the LHC Run-3

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Resistive Plate Chambers are used in the ATLAS experiment and provide the muon trigger and two coordinate measurements in the barrel region $|\eta| < 1.05$

In preparation for the coming years of LHC running at higher luminosity, besides the New Small Wheel project which is expected to complement the ATLAS Muon spectrometer in the end-cap regions, a smaller size project, known as BIS78, is being developed aiming at the installation during the LHC Long Shutdown 2 (2019-2020).

The BIS78 project proposes to reinforce the fake rejection and the selectivity of the muon trigger in the transition region between the ATLAS barrel and the endcaps ($1 < |\eta| < 1.3$) by adding 32 RPC triplets along z on the edges of the inner barrel even sectors (BIS7 and BIS8) as this region is characterized by high rate due to secondary charged tracks generated by beam halo protons and a lack of detector instrumentation.

Due to the narrow available space, the project foresees to replace the existing MDTs in this area with integrated muon stations formed by small diameter tubes MDT (sMDT) and a new generation of RPC chamber, capable of withstanding the higher rates and provide a robust standalone muon confirmation.

These new RPCs are based on novel design of the gas volume with thinner gas gap (1mm vs 2mm of the legacy RPCs), thinner resistive electrodes, a lower operating voltage and new high gain front-end electronics.

Besides the use in Run-3 and onwards, this project is also of particular relevance as a pilot test in view of the High Luminosity upgrade of the LHC during Long Shutdown 3 when an additional full layer of new RPC triplets is expected to complement the full barrel region in the innermost plane.

This presentation aims at illustrating the state of art of the project, going through the relevant R&D achievements, tests of prototypes, and chamber design. Details on the the detector infrastructure and services along with a roadmap towards the final installation and commissioning during the Long Shutdown 2 (2019-2020) are also discussed.

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