



Contribution ID: 77

Type: Poster

## A study for the ATLAS RPC system upgrade in view of the High Luminosity (HL) LHC

The architecture of the present trigger system in the ATLAS muon barrel was designed according to a reference luminosity of  $1034 \text{ cm}^{-2} \text{ s}^{-1}$  with a safety factor of 5 with respect to the simulated background rates, confirmed by the 2012 data.

In the HL-LHC conditions, we expect a luminosity of  $5 \times 1034 \text{ cm}^{-2} \text{ s}^{-1}$  and a rate about an order of magnitude higher than the present one. This, while boosting the demand of trigger performance to increase the fake rejection, the muon momentum selectivity and coverage, affects the robustness against the ageing effects. This scenario leaves the present RPC muon trigger without adequate safety margins and suggests an appropriate upgrade plan, involving both the detector, the trigger and readout electronics.

We present a study for an upgrade of the ATLAS RPC system, under evaluation by the ATLAS collaboration, conceived to maintain full efficiency for the 20 years future operation scheduled. The upgrade consists mainly in installing an additional layer of new generation RPCs in the inner barrel. This will increase the redundancy and the acceptance, now reduced to 70% due to the barrel toroid magnets and services. The present RPC system performances will also benefit of a new readout electronics foreseen to cope with the upgraded ATLAS DAQ. A non-negligible side benefit of this upgrade scheme is providing ATLAS with good TOF capabilities: a prompt time resolution of few hundreds of ps, 10 m lever arm and four independent measurements will extend the ATLAS potential for new physics discoveries.

**Primary author:** AIELLI, Giulio (Universita e INFN Roma Tor Vergata (IT))

**Presenter:** AIELLI, Giulio (Universita e INFN Roma Tor Vergata (IT))

**Track Classification:** Experiments: 2a) Experiments & Upgrades