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Cavern background measurement with the ATLAS RPC system

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The measurement of cavern background has been carried out systematically since the beginning of LHC, as soon as the luminosity produced a detectable signal, from $L=1028 \text{ cm}^{-2}\text{s}^{-1}$ of the early 2010 operation up to $L=3.5 \times 10^{33} \text{ cm}^{-2}\text{s}^{-1}$ at the end of 2011 proton-proton run, which is just 1/3 of the nominal LHC luminosity. The reason for this is to early foresee the running condition for the detector for the nominal LHC luminosity and beyond, in view of the super-LHC upgrade.

Background Montecarlo calculations have been validated against data and the background map analysis pointed out hotspots due to localized cracks in the radiation shielding.

The RPCs participated to this effort since the earliest stages providing an accurate correlation between luminosity and background, a 3D background map in the barrel region and a direct measurement of the cavern activation. Moreover due to the high sensitivity and very good signal to noise ratio of the proposed method, based on the gap current, the measurement was provided in real time through the DCS, revealing as a strong diagnostic element of the RPC system.

In this presentation the method and the results will be shown in comparison with Montecarlo estimates and other measurements coming from different systems.

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