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Results on the R&D campaign on the improved CMS Resistive Plate Chamber with a new Front End electronics

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The upgrade of the CMS Resistive Plate Chamber (RPC) chambers consists partially of the installation of new RPC detectors in the forward region. High background conditions are expected in this region during the high-luminosity phase of the Large Hadron Collider (HL-LHC), therefore an improved RPC detector has been proposed which sustains a higher rate capability. Apart from the modified detector design, a new front-end electronics has been used which significantly reduces the threshold, being able to work with lower operational high voltage and hence reducing the effect of aging. In this work the results of the tests at the CERN Gamma Irradiation Facility are presented, in which the improved RPC detector with the new front-end electronics has been tested under a large gamma background using a dedicated intense muon beam. Performance results are reported as function of the background conditions, validating this detector to work under the expected background conditions at the HL-LHC.

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