

CMS Improved Resistive Plate Chamber Studies in Preparation for the High Luminosity Phase of the LHC

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The high luminosity expected from the HL-LHC will provide a great opportunity for precise physics measurements and searches for new physics. Nevertheless, the increased rate of particles coming from the collisions will pose a challenge for the CMS detectors.

To prepare the muon system for the challenging conditions during the high luminosity phase, several upgrades have been planned and are being developed. Thanks to their fast time and space resolution, the Resistive Plate Chambers form part of the trigger system and are installed both in the barrel and endcap regions as a subsystem of the muon detector.

As part of the upgrades, the muon forward region will be enhanced with two stations, called RE3/1 and RE4/1, equipped with improved Resistive Plate Chambers (iRPCs). These detectors use thinner electrodes, a narrower gas gap (1.4 mm compared to 2 mm in the current design) and improved front-end electronics. These features allow them to withstand particle rates up to few kHz/cm^2 . Furthermore, they will extend the geometrical acceptance of the RPCs from a pseudorapidity of 1.9 to 2.4. In this work we present different studies related to the iRPC prototypes in preparation for the high luminosity phase of the LHC.

Title

Prof.

Your name

Cecilia Uribe Estrada

Institute

Benemérita Universidad Autónoma de Puebla (BUAP)

email

cecilia.uribe.estrada@cern.ch

Nationality

Primary author: URIBE ESTRADA, Cecilia (Autonomous University of Puebla (MX))

Presenter: URIBE ESTRADA, Cecilia (Autonomous University of Puebla (MX))

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