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Performance of improved RPCs demonstrator for the CMS Phase 2

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With the increase of the LHC luminosity foreseen in the coming years, many detectors currently used in the different LHC experiments will be impacted dramatically and some need to be replaced. The new ones should be capable not only to support the high particle rate, but also to provide time information to reduce the data ambiguity due to the expected high pileup. The CMS collaboration have shown that the RPCs, using smaller gas gap (1.4 mm) and low-resistivity High Pressure Laminate, can stand rates of few kHz/cm2. They are equipped with new electronics sensitive to low signal charges. This electronics was developed to read out the RPC detectors from both sides of a strip and, using timing information, to identify the position along it. The excellent relative resolution of ~200 ps leads to a space resolution of few cm. The absolute time measurement, determined by RPC signal around 500 ps, will also reduce the data ambiguity due to the highly expected pileup at the Level 1 trigger. An engineering prototype of the final chamber was qualified in test beams at Gamma Irradiation Facility (GIF), located on one of the SPS beam lines at CERN. In addition, 4 demonstrator chambers have just been installed in CMS cavern. This talk will present the results of the tests done in GIF, as well as brand new results from the demonstrator chambers.

Collaboration

CMS

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