Studies of HV discharges in GEM detectors for the CMS Endcap Muon System

Friday 16 December 2022 11:30 (20 minutes)

From 2018 to the first months of 2022, the Large Hadron Collider (LHC) and the experiments installed on the accelerator ring have performed the Long Shutdown 2 (LS2) upgrade campaign, to cope with the challenges offered by the High Luminosity LHC project. This phase will consist in an increase of the luminosity delivered to the experiments, aiming at enlarging the data statistics, for search of physics beyond the Standard Model. In particular during LS2, the muon spectrometer of the CMS experiment has been upgraded, installing the GE1/1 station based on the Gas Electron Multiplier (GEM) technology. This station is positioned in the endcap region of CMS muon system and covers the pseudorapidity range $1.55 < |\eta| < 2.18$. On 5th July 2022, Run-3 LHC phase has begun, performing collision at the energy of 13.6 TeV. In this context, the newly installed GEM detectors started to experience the creation of discharges, when the beams are colliding inside of CMS. To monitor these events and to understand how to safely operate the detectors, a study on these phenomena became necessary. It analyzes the current intensity of discharges and their rate in the different detectors in terms of discharges recorded per unit of registered luminosity and per hour. It has been observed that some chambers produce a number of events significantly higher than the modal value of rate over the whole chambers population. The reasons responsible for this behavior are currently under investigation. In this talk, the status of the analysis of discharges will be presented, illustrating the evolution of rates observed with different LHC beam configurations and varying the High Voltage working point of GE1/1 chambers.

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Session Classification: Session 13