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Commissioning and operation in magnetic field of CMS GE1/1 station

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In December 2018 the Large Hadron Collider entered the Long Shutdown 2 phase, during which a maintenance program of the LHC took place.
The upgrades of the accelerators aim at increasing the instantaneous luminosity, to enlarge the statistics collected in the data taking runs, up to a factor 5-7 beyond the original LHC design in the HL-LHC program.

To cope with this, the experiments must be upgraded accordingly. Concerning the muon spectrometer, the CMS collaboration has began the installation of detectors based on the triple-GEM technology. These aim at keeping under control the trigger rate in the high pseudorapidity region, sustaining a high level of radiations and increasing the redundancy in the muon track reconstruction.

The installation of the first CMS GEM station GE1/1 was completed and the final phases of its commissioning are ongoing, in preparation of the Run 3. In addition, a first demonstrator of the GE2/1 station chambers was installed in CMS.

In this contribution the status of the commissioning of GE1/1 services (gas, cooling, low voltage and high voltage) will be presented, focusing in particular on the role played by HV trips in the chamber operation and on the strategies adopted to minimize their occurrence.

In October and November 2021 the GE1/1 chambers were operated for the first time in presence of magnetic field in CMS.
The phenomena observed suggested a dedicated test to study GE1/1 chambers behavior during a magnetic field ramp using the Goliath magnet in the CERN North Area.
The aim of the test was to gain a deep understanding of the behavior of GE1/1 chambers in magnetic field and consequently developing procedures to be followed in CMS.
The results obtained will be illustrated and the phenomena observed in CMS will be discussed in light of those.

Collaboration

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