Contribution ID: **1031** Type: **Talk**

Electrical Discharge Mitigation Strategies for Future CMS GEM Systems GE2/1 and ME0

Wednesday 29 July 2020 16:30 (15 minutes)

In 2019-2020, the first of the CMS gas electron multiplier (GEM) systems, GE1/1, was installed into the CMS muon endcaps, to be fully operational by Run 3. This represents the first of three major GEM-based additions into CMS, to be followed in future runs by GE2/1 and the very forward muon tagger ME0. R&D for these two future systems is currently well under way, with a focus on eliminating potential damage due to propagating electrical discharges within the detector, as was seen in the demonstrator system for GE1/1. This contribution presents results from the various mitigation strategies, including changes to the front-end readout electronics and to the construction of the detectors themselves. These results detail the reduction in propagating discharges from the various strategies, as well as unintended consequences of those strategies, such as the presence of bipolar crosstalk signals in chambers equipped with double-segmented GEM foils. Future prospects for the two systems will be discussed.

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Secondary track (number)

12.

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Session Classification: Detectors for Future Facilities (incl. HL-LHC), R&D, Novel Techniques

Track Classification: 13. Detectors for Future Facilities (incl. HL-LHC), R&D, Novel Techniques