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**Frontend Electronics Integration for the GE2/1 GEM Detector for the Phase-2 Muon System Upgrade of the CMS Experiment**[1]
STEPHEN BUTALLA, MARCUS HOHLMANN, Florida Inst of Tech, COMPACT MUON SOLENOID COLLABORATION — The High Luminosity upgrade of the Large Hadron Collider (LHC) at CERN will increase the luminosity by approximately a factor of five. Consequently, the Phase 2 upgrade of the muon system of the Compact Muon Solenoid (CMS) experiment at the LHC is underway to help cope with the higher muon trigger rates from the increased luminosity. One of the detectors approved for mass production for the upgrade is the GE2/1 gas electron multiplier (GEM) detector. Critical to the performance of this detector system are the readout and frontend electronics and their operation in the intense radiation environment of the CMS experiment. The frontend electronics on the GE2/1 include the GEM electronics board, 12 VFAT3 application specific integrated circuit cards, and one FPGA-based optohybrid board for communicating with the backend electronics. We discuss the electronics testing and integration procedure for the GE2/1 GEM detector at both CERN and Florida Institute of Technology. An overview of the hardware and the procedure for establishing communication with the frontend electronics will be given. Digital-to-analog calibration scans, equivalent noise charge measurements at different thresholds, latency measurements, and S-bit mapping and rate measurements for triggering are also presented.

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