PERFORMANCE OF TRIPLE-GEM DETECTORS FOR THE PHASE-2 CMS UPGRADE AND A HIGH-RESOLUTION GEM TELESCOPE MEASURED IN A TEST BEAM

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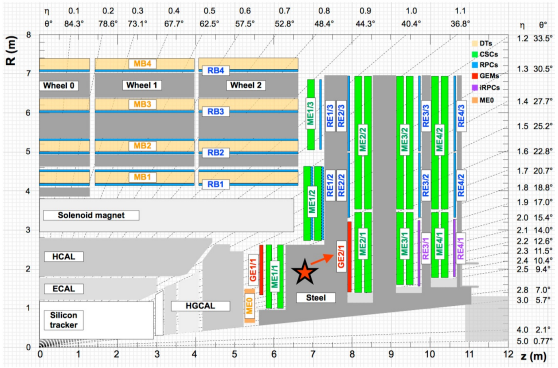
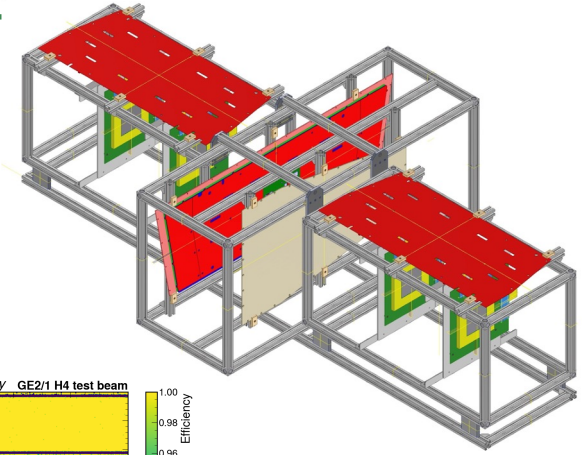
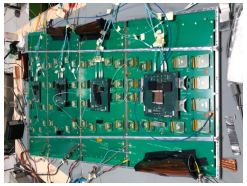
2022 Pisa Meeting on advanced detectors

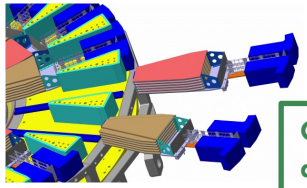


Phase-2 CMS GEM detectors + triple-GEM tracker tested in CERN North Area with muon and pion beam

- GE2/1 final design detector
- ME0 second-generation detector (azimuthal segmentation)
- 4x 10x10 cm^2 high-resolution (250 µm pitch) triple-GEM telescope
- 20x10 cm^2 triple-GEM prototype with random-hole segmentation







Final front-end electronics and DAQ software

- VFAT3 front-end ASIC
- OptoHybrid on-detector FPGA
- Custom back-end FPGA (Xilinx VU13P)

GE2/1 and ME0 detector performance and design validation

- *Excellent noise levels (<0.5 fC)*
- *Efficiency over 99%*

Good triple-GEM tracking performance

- Average *81 µm space resolution*
- Strong dependency on cluster size effects of delta rays and reduced efficiency effects