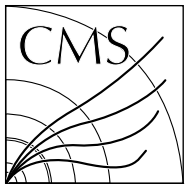
Available on CMS information server

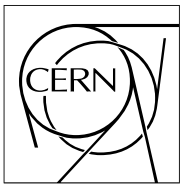
CMS DP -2022/036



The Compact Muon Solenoid Experiment

CMS Performance Note

Mailing address: CMS CERN, CH-1211 GENEVA 23, Switzerland



05 October 2022

GE1/1 Event Displays

CMS Collaboration

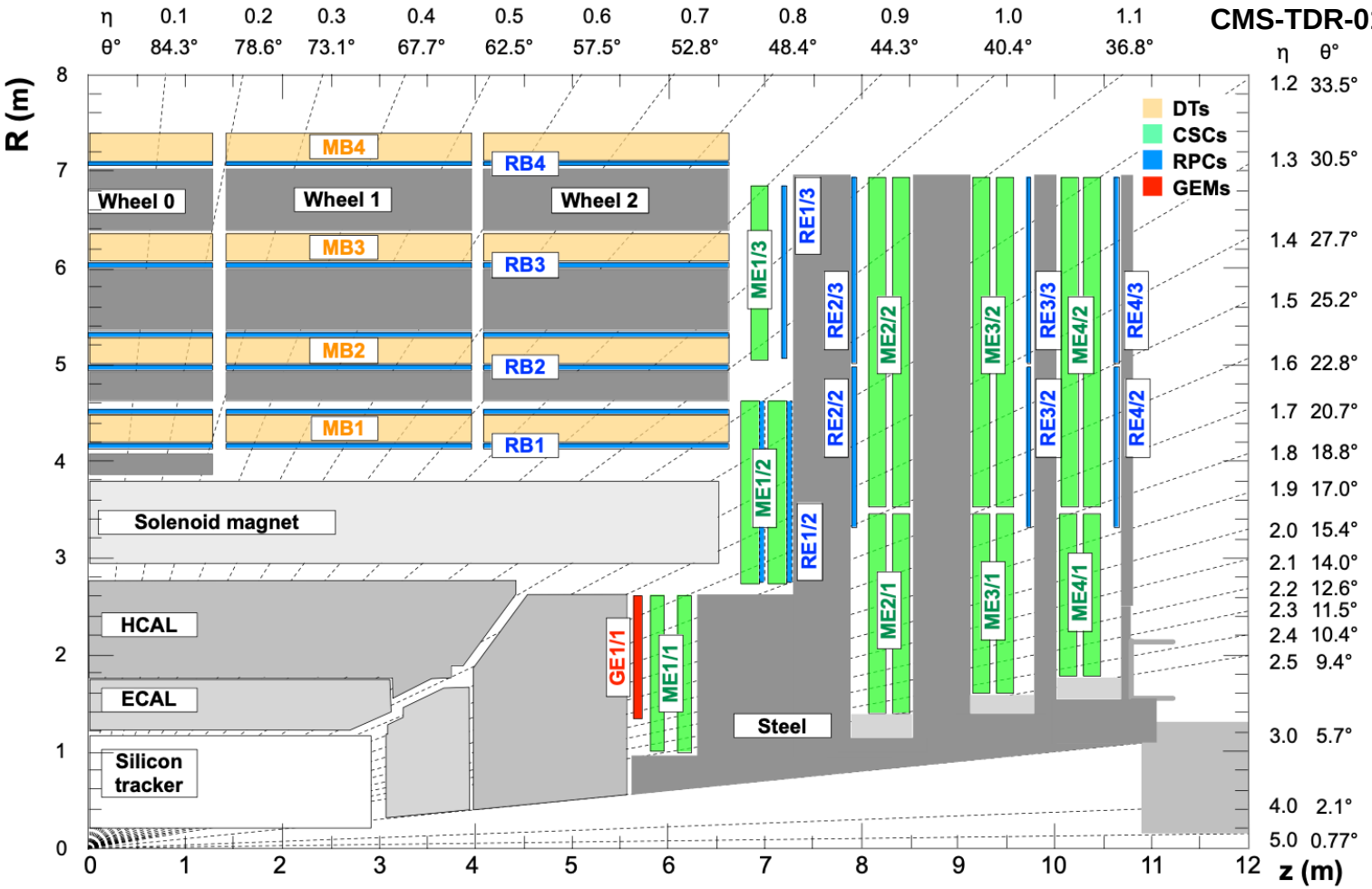
Abstract

Event displays for Z boson event candidates with two muons in the DT system and the GEM+CSC system in 13.6 TeV pp collision collected by the CMS detector at 3.8 T in July 2022.

GE1/1 Event Displays

CMS Collaboration

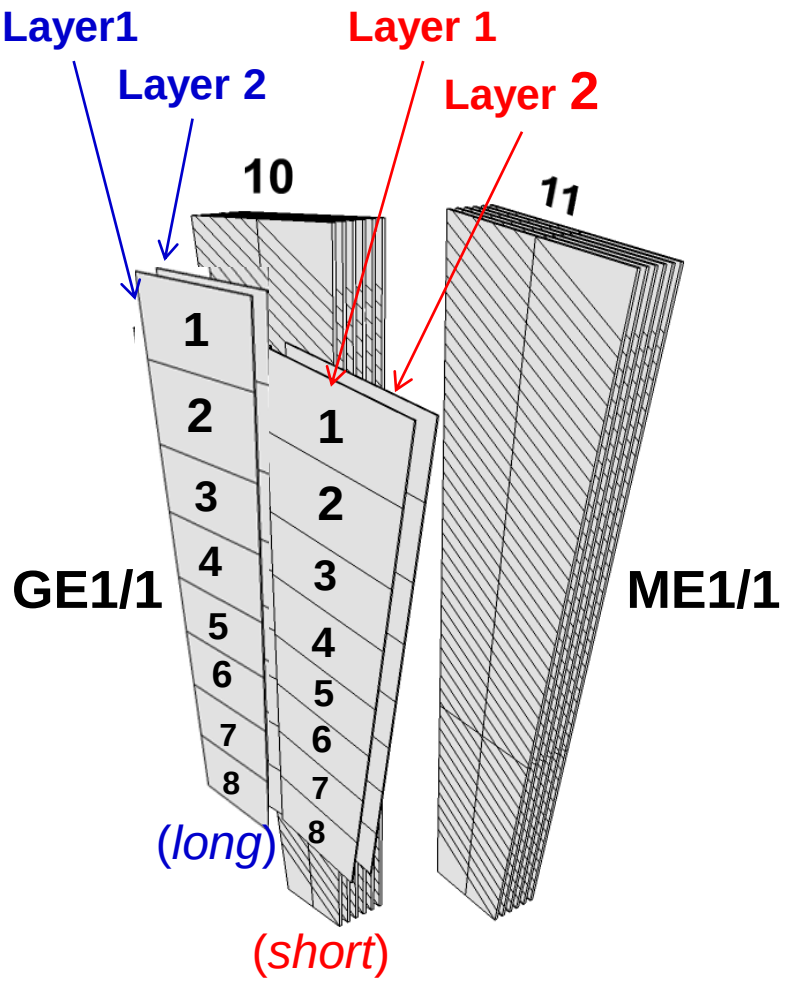
Contact: cms-dpg-conveners-gem@cern.ch

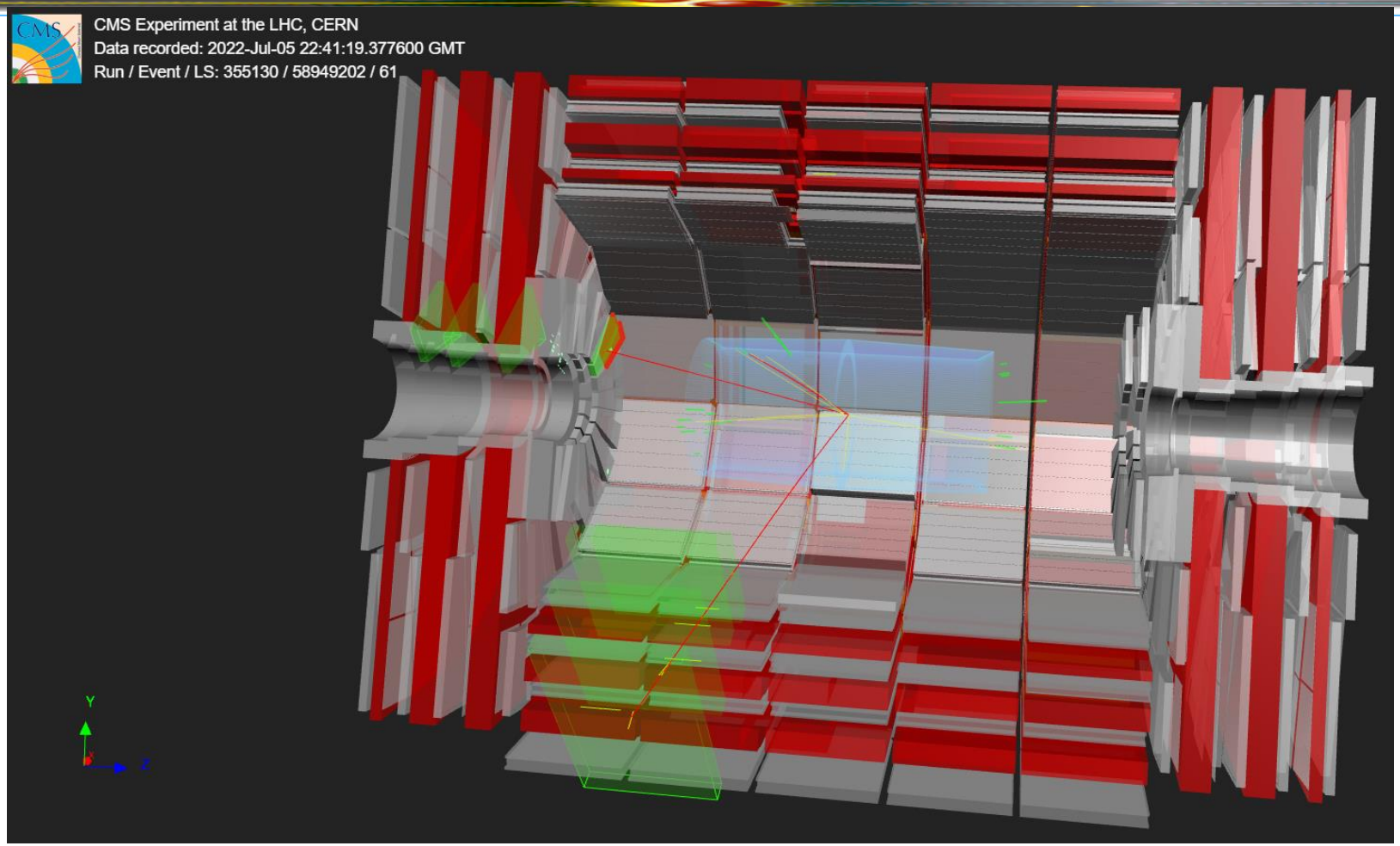


An R-z cross section of a quadrant of the upgraded CMS detector high-lighting the location of the new GE1/1 station in red with triple-GEM technology in the CMS muon endcap region. The existing muon stations are drift tubes (DTs) in the MB system, cathode strip chambers (CSCs) in the ME system, and resistive plate chambers (RPCs) in the RB and RE system, and the flux-return steel yoke (dark areas) are also shown.

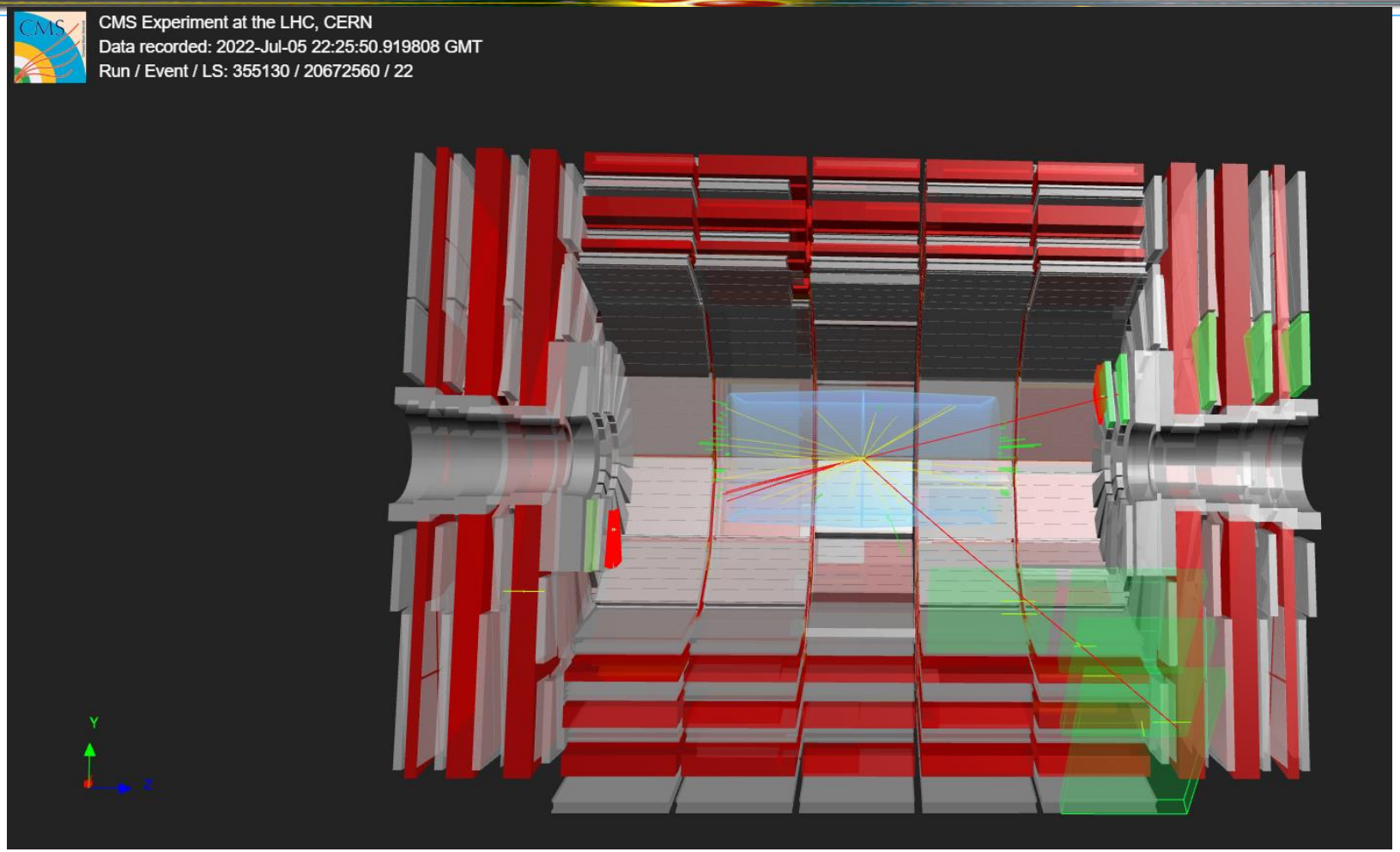
GE1/1 Long & Short Chambers

- **GE1/1: GEM Endcap Station1 Ring1**
- Each GE1/1 superchamber, consisting of two triple-GEM detectors referred to as layer 1 and layer 2, covers $\Delta\varphi = 10.15°$.
- The superchambers are arranged in a staggered configuration with an overlap of 0.075°, alternating in ϕ between a long version covering a pseudorapidity region of $1.55 < |\eta| < 2.18$ and a short version covering $1.61 < |\eta| < 2.18$ (right figure).
- Short and long superchambers for maximum coverage.
- 36 staggered superchambers are mounted in front of ME1/1 at Station 1 of each endcap during long shutdown 2 (LS2)
- Each detector is segmented with eight η partitions ($i_\eta = 1{\sim}8$). Each η partition has 384 radial strips (3 VFAT chips): $\Delta\phi$ = 461 μrad or $\Delta R\phi$ = 0.992 mm at R = 2 m.





[Run 355130, Event 58949202] A perspective view of an event display for two muons in the DT system (p_T = 32.6 GeV, η = -0.371, ϕ = -2.60) and the GEM+CSC system (p_T = 35.8 GeV, η = -1.94, ϕ = 0.567) in 13.6 TeV pp collision collected by the CMS detector at 3.8 T in July 2022. The GEM chambers are drawn in red, DT and CSC chambers in green. Its invariant mass is 90.4 GeV. The third muon candidate (red) is less energetic and identified as a “tracker” muon. Other charged particles are shown in yellow.



[Run 355130, Event 20672560] A perspective view of an event display for two muons in the DT system (p_T = 40.1 GeV, η = 0.761, ϕ = -2.49) and the GEM+CSC system (p_T = 37.3 GeV, η = 1.96, ϕ = 0.961) in 13.6 TeV pp collision collected by the CMS detector at 3.8 T in July 2022. The GEM chambers are drawn in red, while DT and CSC chambers in green. Its invariant mass is 90.7 GeV. Less energetic muons (red) in the minus endcap are also shown. One of them is just with CSC and GEM at station 1. Other charged particles are shown in yellow.