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Type: Talk

The CMS electromagnetic calorimeter

Wednesday 28 August 2024 12:40 (20 minutes)

The CMS electromagnetic calorimeter (ECAL) at the CERN Large Hadron Collider (LHC) is a high granularity, homogeneous detector composed of scintillating lead-tungstate crystals. Designed to provide exceptional energy resolution for electrons and photons, the ECAL was pivotal in the discovery of the Higgs boson, particularly in the two-photon and two Z boson decay channels. With the upcoming transition to the High Luminosity LHC (HL-LHC), the CMS detector is undergoing a significant Phase-2 upgrade to handle the increased instantaneous and integrated luminosity in a more challenging environment.

This talk will review the original design considerations of the CMS ECAL, emphasizing its high energy resolution capabilities and its critical role in various physics analyses. We will briefly introduce the precise calibration methods and energy reconstruction algorithms developed and refined during LHC Run III to ensure the stability of the energy scale and resolution. Additionally, we will describe the operation details involving the trigger, handling of spikes, and data quality monitoring (DQM) with machine learning.

For the HL-LHC era, the central barrel portion of the ECAL, designed to be radiation-tolerant, will largely remain intact. However, upgrades are necessary to maintain performance, including a reduction in operating temperature and enhancements to the readout electronics. These upgrades will also facilitate precision time measurements, improving the determination of the production vertex location in di-photon events. We will present an overview of these upgrades, supported by results from recent test beam studies, highlighting the continued importance of the ECAL in future physics analyses, including the study of di-Higgs production.

Performance and upgrades will be further detailed in two other talks, providing a comprehensive view of the ECAL's role and enhancements.

Internet talk

No

Is this an abstract from experimental collaboration?

Yes

Name of experiment and experimental site

CMS, <https://cms.cern/>

Is the speaker for that presentation defined?

Yes

Details

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