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Monitoring and Correcting for Response Changes in the CMS Lead-tungstate Electromagnetic Calorimeter in LHC Run2

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Content

The CMS Electromagnetic Calorimeter (ECAL) is made of 75848 lead-tungstate scintillating crystals. The LHC has delivered excellent performance in Run2, allowing CMS to record data corresponding to an integrated luminosity of more than 40 fb⁻¹ at 13 TeV. The Run2 luminosity increase has caused higher radiation doses in the ECAL crystals and photodetectors, affecting the light output. The excellent intrinsic energy resolution of the CMS ECAL is preserved with the aid of a precise monitoring system. Crystal and photodetector response changes are monitored in real time by a sophisticated apparatus using lasers and LEDs. Soon after data are taken, a computer farm processes the laser and LED monitoring events and computes precise corrections to be used in the event reconstruction within 48 hours of data-taking. Similar corrections must also be applied at the trigger level. This talk describes the evolution of the crystal response, the components of the CMS ECAL monitoring system, and how it is operated in Run2.

Summary

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