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Optimising the performance of the CMS Electromagnetic Calorimeter in LHC Run 2 for the measurement of Higgs boson properties

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The CMS Electromagnetic Calorimeter (ECAL), is a high granularity lead tungstate crystal calorimeter operating at the CERN LHC. The original design placed a premium on excellent energy resolution for the discovery and subsequent characterisation of the Higgs boson. Excellent energy resolution and efficient identification for photons are essential to reconstruct the Higgs boson in the H->gg decay channel, for measurements of the mass, signal strength and other related properties of the Higgs boson.

A full recalibration of the CMS ECAL has recently been performed using the full LHC Run 2 (2015-2018) dataset. The stability of the energy response versus time is ensured by a dedicated laser-based monitoring system, together with additional time-dependent corrections derived from physics events. A dedicated calibration of each detector channel has also been performed, exploiting electrons from W and Z boson decays, photons from pi0/eta decays, and the azimuthally symmetric energy distribution of minimum bias events. These refined calibrations have resulted in significant improvements in ECAL energy resolution and energy scale stability, compared to the preliminary calibrations that have previously been used in the analysis of Run 2 data.

This talk will present the ECAL calibration strategies that have been implemented and the resulting performance achieved by the ECAL for LHC Run 2. The potential impact of these improvements on measurements of Higgs boson properties will also be described.

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