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Precision electromagnetic calorimetry at the energy frontier: The CMS ECAL at the LHC Run 2

The LHC Run 2 has recently begun, with proton-proton collisions at an unprecedented centre-of-mass energy of 13 TeV and will soon move to a reduced bunch spacing of 25ns.

After the successful quest for a Higgs boson via its electromagnetic decays, and the subsequent measurement of its mass, the CMS electromagnetic calorimeter (ECAL) is at the forefront of precision measurements and the search for new physics from analysis of the several hundred inverse femtobarns of data which will be recorded over the coming 7-8 years.

In this talk we present new reconstruction algorithms and calibration strategies which aim to maintain, and even improve, the excellent performance of the CMS ECAL under the new challenging conditions of Run 2.

The CMS ECAL is a high-resolution, hermetic, and homogeneous electromagnetic calorimeter made of 75,848 scintillating lead tungstate crystals. Its exceptional precision, as well as its timing performance, are invaluable tools for the discovery of new physics with the CMS detector at the LHC.

The excellent performance of the calorimeter relies on precision calibration maintained over time, despite severe irradiation conditions. A set of inter-calibration procedures using different physics channels is carried out at regular intervals to normalize the differences in crystal light transparency and photodetector response between channels, which can change due to accumulated radiation. The timing precision achieved is better than 200ps.

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