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## **CMS ECAL upgrade for precision timing and energy measurements at the High-Luminosity LHC**

The High Luminosity upgrade of the LHC (HL-LHC) at CERN will provide unprecedented instantaneous luminosity of  $\sim 5 \times 10^{34} / \text{cm}^2 / \text{s}$ , leading to an average of 150-200 simultaneous collisions. This high instantaneous luminosity scenario presents a significant challenge for the detectors. The barrel region of the CMS electromagnetic calorimeter (ECAL) will be preserved but will be operated at a lower temperature and with a completely new readout and trigger electronics. A dual gain trans-impedance amplifier and an ASIC providing two 160 MHz ADC channels, gain selection, and data compression will be used in the new readout electronics. The trigger decision will be moved off-detector and performed by powerful and flexible FPGA processors, allowing for more sophisticated trigger algorithms to be applied. The upgraded ECAL will be capable of high-precision energy measurements throughout HL-LHC and will greatly improve the time resolution for photons and electrons above 10 GeV. The performance obtained with the new electronics has been tested at CERN under an electron beam with a matrix of ECAL crystals equipped with APDs.

### **Primary experiment**

CMS

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