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Evolution studies of the CMS endcap calorimeter response and implications for the High-Luminosity LHC upgrade

Calorimetry for the CMS detector is currently performed at the LHC with a lead tungstate crystal electromagnetic calorimeter (ECAL) and a brass/scintillator hadronic calorimeter (HCAL), both divided into barrel and endcap regions. High-Luminosity running at the LHC, which is planned for 2022 and beyond, will imply an order of magnitude increase in radiation levels and particle fluences with respect to the present LHC running conditions. The performance evolution of the CMS calorimeters indicates that an upgrade of the endcap calorimeters will be needed to ensure adequate performance during HL-LHC running. Results from LHC collision periods, beam tests and laboratory measurements are combined to predict the performance of the current detector at the HL-LHC and motivate the need for an upgrade of the endcap calorimeters.

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