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Timing performance of the CMS electromagnetic calorimeter and prospects for the future JACK KING III, Univ of Kansas, CMS COLLABORATION — The CMS electromagnetic calorimeter (ECAL) is made of about 75000 scintillating lead tungstate crystals arranged in a barrel and two endcaps. The scintillation light is read out by avalanche photodiodes in the barrel and vacuum phototriodes in the endcaps. Once read out, the scintillation pulse is amplified and sampled at 40 MHz by the on-detector electronics. The fast signal from the crystal scintillation enables energy as well as timing measurements from the data collected in proton-proton collisions with high energy electrons and photons. The stability of the timing measurement required to maintain the energy resolution is on the order of 1 ns. The single-channel time resolution of ECAL measured at beam tests for high energy showers is better than 100 ps. The timing resolution achieved with the data collected in proton-proton collisions at the LHC Run 2 is presented. The timing precision achieved is used in important physics measurements and also allows the study of subtle calorimetric effects, such as the timing response of different crystals belonging to the same electromagnetic shower. In addition, we present prospects for Run 3 and for the high luminosity phase of the LHC. It is speculated that time information could be exploited for pileup mitigation and for the assignment of the collision vertex for photons. In this respect, a detailed understanding of the time performance and of the limiting factors in time resolution will be important.

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