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Longevity studies of the CMS cathode strip chambers with GIF++

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Radiation hardness studies of the CMS detector's cathode strip chambers have been conducted at the GIF++ gamma irradiation facility at CERN since 2016. During the studies, ME1/1 and ME2/1 chambers, which differ in design and operate in CMS under high background rate, were subjected to intense irradiation. The accumulated charge per unit length of the anode wire reached 1030 mC/cm for ME2/1 and 1170 mC/cm for ME1/1, which is more than three times higher than the integral dose expected for the entire period of HL-LHC operation. The characteristics of the chambers were studied periodically in tests with SPS muon beams. There are no signs of radiation-induced degradation of the chambers. The data obtained confirm the high radiation hardness of cathode strip chambers for operation in extreme conditions of HL-LHC.

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