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Background in the CMS Drift Tubes: measurements with LHC collision data and implications for detector longevity at HL-LH

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In the barrel region of the CMS muon spectrometer Drift Tubes (DT) are installed. They are used for offline tracking of muons and also provide standalone trigger capabilities. Though an upgrade of the DT system electronics is foreseen for High-Luminosity LHC (HL-LHC), the present DT chambers won't be replaced, hence they will be called to operate enduring integrated doses far beyond what they were initially designed for. Together with accelerated ageing studies, accurate measurements of the background-induced hit rates and currents observed over Run-2 are critical to assess the longevity of the DT chambers and to make projections of the expected performance of the system throughout HL-LHC. This report presents the state of the art of the studies about the background affecting the DT system, and links them to results from longevity studies performed exploiting the CERN high-intensity gamma irradiation facility (GIF++). Moreover it describes all measures that have been put in place, by the end of Run-2 and over LS2, to mitigate ageing and, where possible, reduce background level, with the aim of maximising the performance of the DT detector throughout HL-LHC.

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