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## **Longevity studies for the CMS Muon System towards HL-LHC**

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The High Luminosity LHC (HL-LHC) program will pose a great challenge for the different components CMS Muon Detector. Existing systems, which consist of Drift Tubes (DT), Resistive Plate Chambers (RPC) and Cathode Strip Chambers (CSC), will have to operate at 5 times larger instantaneous luminosity than designed for, and, consequently, will have to sustain about 10 times the original LHC integrated luminosity. Additionally, to cope with the high rate environment and maintain good performance, additional Gas Electron Multiplier (GEM) and improved RPC (iRPC) detectors will be installed in the innermost region of the forward muon spectrometer of the CMS experiment. The design of these new detectors will have to assure their long-time operation in a hard environment. Finally, RPC and CSC use gases with a global warming potential (GWP) and therefore a search for new eco-friendly gases is necessary, as part of the CERN-wide program. To address all of these challenges a series of accelerated irradiation studies have been performed for all the muons systems, mainly at the CERN Gamma Irradiation Facility (GIF++), or with specific X-ray sources. In this talk will be reported the status of the studies on the longevity of the different systems of the CMS Muon Detector, after the large integrated charge in the last years. Additionally, actions taken to reduce the actual detector aging and to minimize greenhouse gas consumption will be discussed.

### **Collaboration**

CMS Collaboration

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