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Impact of the radiation background on the CMS muon high-eta upgrade for the LHC high luminosity scenario

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The CMS experiment is preparing an upgrade of its muon detection system, one of the main purposes is to extend the muon detection capabilities in the very forward region ($|\eta| > 1.6$) with the installation of new stations of Cathode Strip Chambers (CSC) and Gas Electron Multiplier (GEM) detector technologies for the second (2019) and third (2023) CMS upgrade scenarios. With the increase of the LHC luminosity to $10^{34} \text{cm}^{-2}\text{s}^{-1}$ an unprecedented and hostile radiation environment will be created, the subsystems most affected will be the ones located in the very forward region where the intense flux of neutrons and photons (from nuclear interactions) can potentially degrade the performance in terms of muon detection and triggering. Using FLUKA simulation the expected radiation background rates are calculated for the regions of interest, the impact on the detector performance is evaluated and possible radiation shielding scenarios are studied.

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