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Monitoring tools for the CMS muon detector: present workflows and future automation

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The CMS muon system presently consists of three detector technologies equipping different regions of the spectrometer. Drift Tube chambers (DT) are installed in the muon system barrel, while Cathode Strip Chambers (CSC) cover the end-caps; both serve as tracking and triggering detectors. Moreover, Resistive Plate Chambers (RPC) complement DT and CSC in barrel and end-caps respectively and are mostly used in the trigger. Finally, Gas Electron Multiplier (GEM) chambers are getting installed in the muon spectrometer end-caps at different stages of the CMS upgrade programme. The CMS muon system has been operated successfully during the two LHC runs allowing to collect a very high fraction of data whose quality fulfills the requirements to be used for physics analysis. Nevertheless the workflows used nowadays to run and monitor the detector are rather expensive in term of human resources. Focus is therefore being put in improving such workflows, both by applying automated statistical tests and exploiting modern machine learning algorithms, inview of the future LHC runs. The ecosystem of tools presently in use will be presented, together with the status of the art of the developments toward more automatised monitoring and the roadmap for the future.

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