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AutoDQM for Anomaly Detection in the CMS Detector

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The Compact Muon Solenoid (CMS) detector at the CERN LHC produces a large quantity of data that requires rapid and in-depth quality monitoring to ensure its validity for use in physics analysis. These assessments are often done by visual inspection which can be time consuming and prone to human error. In this talk, we introduce the "AutoDQM" system for Automated Data Quality Monitoring in CMS to enable prompt and accurate data assessment. AutoDQM uses a beta-binomial probability function, principal component analysis, and autoencoders for anomaly detection. These algorithms were tested on already-validated data collected by CMS in 2022. The algorithms were able to identify anomalous "bad" data-taking runs at a rate 5-6 times higher than "good" runs suitable for physics analysis, demonstrating AutoDQM's effectiveness in improving data quality monitoring.

Mini Symposia (Invited Talks Only)

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