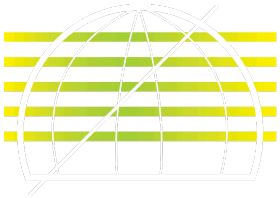

RPC 2022

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ML-based tool for CMS RPC currents quality monitoring

Thursday, 29 September 2022 15:48 (1 minute)

The CMS experiment has 1056 Resistive Plate Chambers (RPCs) in its muon system. Monitoring their currents is the first essential step towards maintaining the stability of the CMS RPC detector performance. An automated tool to carry out this task has been developed. It utilises the ability of Machine Learning (ML) methods in the modelling of the behavior of the current of these chambers. Two types of ML approaches are implemented: Generalized Linear Models (GLM) and Autoencoders. In the GLM case, a set of parameters such as environmental conditions, LHC parameters and high voltage working point are used to characterize the behavior of the detector current. In the autoencoder case, the set of currents for all of the high-voltage channels of the RPC system are used as input and the autoencoder network is trained to reproduce these inputs on the output neurons. Both approaches show very good predictive capabilities, with accuracy of the order of 1-2 μA. These predictive capabilities are the basis for the monitoring tool, which is going to be tested during Run 3. Periodic comparisons between the predicted and measured currents makes possible to notice chamber misbehavior and notify the shifter. All the developed tools are integrated in a framework that can be easily accessed and controlled by a specially developed Web User Interface that allows the end user to work with the monitoring tool in a simple manner.

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Session Classification: Poster session