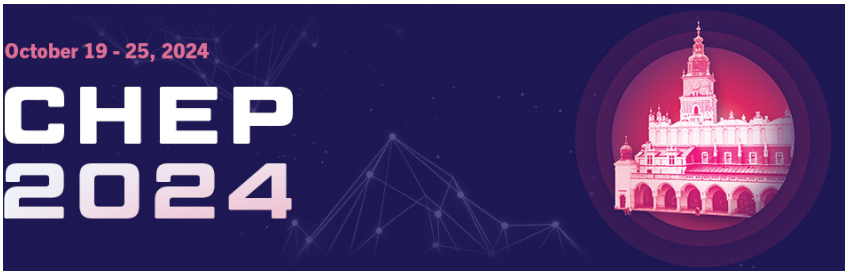

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Kalman filter for muon reconstruction in the CMS Phase-2 endcap calorimeter

Wednesday 23 October 2024 16:00 (15 minutes)

The High Luminosity phase of the LHC (HL-LHC) will offer a greatly increased number of events for more precise standard model measurements and BSM searches. To cope with the harsh environment created by numerous simultaneous proton-proton collisions, the CMS Collaboration has begun construction of a new endcap calorimeter, the High-Granularity Calorimeters (HGCAL). As part of this project, a new reconstruction framework, TICL, is being developed, aiming to exploit the possibilities of heterogeneous computing, and employing machine learning elements.

While TICL has shown impressive results for particle shower reconstruction in HGCAL, the proposed calorimeters'high granularity can be used to track muons. Precise tracking of externally identified muons through the calorimeter allows them to be used for the crucial task of following the evolving inter-cell relative response, and calibrating it, in order to maintain good energy resolution.

In this contribution, we propose to integrate a Kalman Filter into the TICL framework for dedicated muon reconstruction. Furthermore, we present a comprehensive performance evaluation of the algorithm under various conditions akin to those at the HL-LHC. Finally, we discuss the capabilities and limitations of the Kalman Filter as a tool for inter-cell calibration.

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