

Contribution ID: 22

Type: not specified

Development of machine-learning based topological algorithms for the CMS L1 trigger

Tuesday 29 November 2022 14:00 (20 minutes)

At the CMS experiment, a two-layer trigger system is used to decide which collision events to store for later analysis. Due to the large number of low energy collisions at the LHC, currently used triggers often rely on momentum thresholds, only triggering on events with at least one highly energetic object. In searches for certain signatures, this leads to potentially relevant events being discarded in the trigger system. Novel techniques, utilizing machine learning inside the first hardware layer of the trigger, are studied to recover this phase space. Instead of individual objects, these triggers rely on the full event topology to trigger on previously inaccessible events.

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Session Classification: Parallel Session