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Hadronic triggers and trigger object-level analysis at ATLAS

Hadronic signatures are critical to the high energy physics analysis program, and are broadly used for both Standard Model measurements and searches for new physics. These signatures include generic quark and gluon jets, as well as jets originating from b-quarks or the decay of massive particles (such as electroweak bosons or top quarks). Additionally missing transverse momentum from non-interacting particles provides an interesting probe in the search for new physics beyond the Standard Model.

Developing trigger selections that target these events is a huge challenge at the LHC due to the enormous rates associated with these signatures. This challenge is exacerbated by the amount of pile-up activity, which continues to grow. In order to address these challenges, several new techniques have been developed during the past year in order to significantly improve the potential of the 2017 dataset and overcome the limiting factors to more deeply probing for new physics, such as storage and computing requirements for the analysis of this data.

This presentation presents an overview of how we trigger on hadronic signatures at the ATLAS experiment, outlining the challenges of hadronic object triggering and describing the improvements performed over the course of the Run 2 LHC data-taking program, such as analyses of a compact data stream involving trigger-level objects, recorded at a higher rate than is possible for full event data. The performance in Run 2 data will be shown, including demonstrations of the new techniques being used in 2017. We also discuss further critical developments envisaged for the rest of Run 2.

Experimental Collaboration

ATLAS

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