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Identification of b jets in boosted event topologies with CMS

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Summary

As the LHC explores a new energy regime, searches for physics beyond the Standard Model at high mass scale will probe objects produced with a momentum considerably higher than their mass. As a result, the decay products of the boosted parent particle are collimated and clustered into a single 'fat' jet after hadronization. "Boosted b tagging" aims to identify b quarks arising from boosted particles, such as the decay of highly Lorentz-boosted top quarks via $t \rightarrow Wb$, with the W boson decaying hadronically, or for instance boosted Higgs or Z bosons decaying to a b quark pair. Jet substructure techniques can be used to resolve the subjects corresponding to the hadronized partons inside the fat jets. In that case, standard b tagging algorithms can be applied on the subjects. For the identification of boosted Higgs or Z bosons decaying to a b quark pair, a different strategy is envisaged using the novel double- b tagger that aims to identify both B hadron decays in the fat jet. In this presentation, we present the strategies and tools for identifying b jets in boosted topologies with the CMS experiment as well as the related performance measurements using the 13 TeV proton collisions.

Presenter: FERENCEK, Dinko (Institute Rudjer Boskovic (HR))

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