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Identification of b-quark Jets in the CMS experiment

The CMS experiment investigates high-energetic proton-proton collisions at the LHC, in order to broaden the knowledge of the Standard Model (SM) of particle physics and to discover possible new physics beyond the SM.

A large fraction of the CMS physics program relies on the identification of jets containing the decay of a B hadron (b jets). The b jets can be discriminated from jets produced by the hadronization of light quarks based on characteristic properties of B hadrons, such as the long lifetime or the presence of soft leptons produced during their decay.

The CMS detector, with its excellent tracking system, robust lepton identification and finely segmented calorimeters, is well suited to the task of identification of b jets (b tagging). An overview of the large variety of b-tagging algorithms and the measurement of their performance with data collected in 2011 and 2012 are presented. The algorithms described are based either on the identification of tracks displaced from the primary proton-proton collision, the reconstruction of secondary vertices or the presence of soft leptons inside jets. Some algorithms combine this information using multivariate techniques.

The performance of b tagging at high energy and high pile-up conditions, which will be faced during the 13 TeV collisions starting in 2015, is discussed, as well as the improvements foreseen from 2017 with the upgrade CMS detector.

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