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## Identification of heavy-flavour jets with the CMS detector in pp collisions at 13 TeV

By: [Sirunyan, AM](#) (Sirunyan, A. M.)<sup>[1]</sup>; [Tumasyan, A](#) (Tumasyan, A.)<sup>[1]</sup>; [Adam, W](#) (Adam, W.)<sup>[2]</sup>; [Ambrogi, F](#) (Ambrogi, F.)<sup>[2]</sup>; [Asilar, E](#) (Asilar, E.)<sup>[2]</sup>; [Bergauer, T](#) (Bergauer, T.)<sup>[2]</sup>; [Brandstetter, J](#) (Brandstetter, J.)<sup>[2]</sup>; [Brondolin, E](#) (Brondolin, E.)<sup>[2]</sup>; [Dragicevic, M](#) (Dragicevic, M.)<sup>[2]</sup>; [Ero, J](#) (Ero, J.)<sup>[2]</sup> ...More

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### Abstract

Many measurements and searches for physics beyond the standard model at the LHC rely on the efficient identification of heavy-flavour jets, i.e. jets originating from bottom or charm quarks. In this paper, the discriminating variables and the algorithms used for heavy-flavour jet identification during the first years of operation of the CMS experiment in proton-proton collisions at a centre-of-mass energy of 13 TeV, are presented. Heavy-flavour jet identification algorithms have been improved compared to those used previously at centre-of-mass energies of 7 and 8 TeV. For jets with transverse momenta in the range expected in simulated  $t(\bar{t})$  over  $\bar{b}$  events, these new developments result in an efficiency of 68% for the correct identification of a  $b$  jet for a probability of 1% of misidentifying a light-flavour jet. The improvement in relative efficiency at this misidentification probability is about 15%, compared to previous CMS algorithms. In addition, for the first time algorithms have been developed to identify jets containing two  $b$  hadrons in Lorentz-boosted event topologies, as well as to tag  $c$  jets. The large data sample recorded in 2016 at a centre-of-mass energy of 13 TeV has also allowed the development of new methods to measure the efficiency and misidentification probability of heavy-flavour jet identification algorithms. The  $b$  jet identification efficiency is measured with a precision of a few per cent at moderate jet transverse momenta (between 30 and 300 GeV) and about 5% at the highest jet transverse momenta (between 500 and 1000 GeV).

### Keywords

Author Keywords: [Particle identification methods](#); [Pattern recognition, cluster finding, calibration and fitting methods](#); [Performance of High Energy Physics Detectors](#)

KeyWords Plus: [GLUON SPLITTING RATE](#); [HADRONIC Z-DECAYS](#); [GEANT4](#); [PAIRS](#)

### Author Information

Reprint Address: Sirunyan, AM (reprint author)

+ Yerevan Phys Inst, Yerevan, Armenia.

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