

# A new charm quark tagging algorithm at the CMS detector.

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At the Compact Muon Solenoid (CMS), both Standard Model (SM) and Beyond Standard Model (BSM) physics processes can result the final states with charm quark jets. Charm quarks hadronize to D mesons which could travel some distance in the CMS silicon tracker before decaying into showers of detectable particles, called jets. Consequently, charm jets can be distinguished by particular properties such as secondary vertices from displaced tracks with respect to the primary interaction.

The algorithm to identify charm jets, c-tagging algorithm, is invented based on Combined Secondary Vertex algorithm for b-tagging. C-tagging uses multivariate analysis (MVA) techniques to study a set of jet properties in order to identify jets originated from charm quarks. It is the first of its kind at the CMS collaboration. The c-tagging algorithm is integrated into the CMS software (CMSSW). It will be used in supersymmetry (SUSY) searches for new particles such as stop ( $\tilde{t}$ ), the SUSY partner of standard model (SM) top, that may subsequently decay to a charm quark and the lightest supersymmetric particle (LSP), and for SM precision measurements in the data taking at the Large Hadron Collider (LHC) in 2015 and 2016.

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