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Measurement of the b-tagging efficiency in the CMS experiment with the first LHC collisions.

Abstract

Jets originating from bottom (b) quarks, play an important role in the study of Standard Model processes together with the search for new physics. In the CMS experiment a considerable effort is dedicated to the development and the performance study of so-called b-tagging algorithms. On the other hand, the top quark which is produced in pair with a high rate at the LHC, decays near 99% of the time to a b-quark. Hence it provides a rich source of b-quark jets, suitable for b-jet identification studies. In this thesis, a fully data-driven method to measure the b-tagging efficiency, using top quark events in its semi-electron final state, is discussed. The result of the application of the method on the first LHC collisions in 2010 is reported. The method can be extended to a simultaneous top quark cross section and b-tagging efficiency measurement, therefore resulting in smaller uncertainties.