

Identification of additional b -jets in the $t\bar{t}$ plus heavy flavor production with two leptons of the opposite sign in the final state using BDT for differential cross- section measurements

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Top quark pair-production in association with one or two additional b -jets is one of the main backgrounds in the search for $t\bar{t} + H$ production, and in BSM physics searches involving top and bottom quarks in the final states. Precise measurement of $t\bar{t} + b$ and $t\bar{t} + bb$ differential cross sections will help to significantly reduce systematic and modeling uncertainties in future BSM searches and measurements of the top-Higgs coupling. A BDT that discriminates between b -jets which do or do not originate from top quarks decays has been developed in the opposite-sign dilepton channel. The method has higher purity compared to the existing method based on the angular distributions between b -jets and leptons. Preliminary results show that with the new method we can accurately measure the p_T spectra of b -jets from top quark decays and of the leading additional b -jet up to 400 GeV, and the sub-leading additional b -jets p_T up to 300 GeV. The analysis uses LHC proton-proton collision data at the center-of-mass energy $\sqrt{s} = 13$ TeV with an integrated luminosity of 139 fb^{-1} collected with the ATLAS detector in 2015-2018.

Career stage

Graduate student

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Session Classification: B and Top