DETERMINATION OF THE POLE TOP QUARK MASS FROM LHC EXPERIMENTAL DATA FOR SINGLE- AND DOUBLE-DIFFERENTIAL CROSS-SECTIONS FOR TOP QUARK PAIR PRODUCTION

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In this report, we present the results of our research into the method for determining the pole top quark mass based on the analysis of multiple differential cross-sections. For this study we use normalized differential cross-sections for the $t\bar{t}$ pairs production in the semilepton channel in proton-proton collisions at $\sqrt{s}$= 13 TeV, published by the ATLAS collaboration [1].

We studied the sensitivity of differential cross sections as a function of four kinematic variables: the invariant mass of the $t\bar{t}$ pair, the rapidity of the $t\bar{t}$ pair, the transverse momentum of the top quark, and the rapidity of the top quark. The pole top quark mass was determined by comparing actual measured cross-sections with theoretical predictions calculated at NNLO [2]. For this purpose, the χ^2 minimization method was used.

A systematic determination of the top quark mass was performed using single-differential cross-sections of these kinematic variables, their pairwise combinations and double-differential cross-sections of the invariant mass and the rapidity of the $t\bar{t}$ pair.

The results are compared and analyzed, and it is shown that the use of two single-differential cross-sections can give a more accurate result than the use of a double-differential one.

Bibliography

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