## Contribution submission to the conference Heidelberg 2022

**Measurement of the top quark pole mass using $t\bar{t}$+1 jet events with the CMS experiment** — •Sebastian Wuchterl[1], Katerina Lipka[1], and Matteo Defranchis[2] — [1]DESY — [2]CERN

The top quark is the most massive elementary particle known. Its mass, $m_t$, is a fundamental parameter of the Standard Model (SM), and its value needs to be determined experimentally. A precise measurement of $m_t$ and the masses of the W and Higgs bosons play a crucial role in precision tests of the SM. Additionally, the value and the uncertainty of $m_t$ are driving predictions for the energy dependence of the Higgs quartic coupling, which determines the stability of the electroweak vacuum. In proton-proton collisions at the LHC, top quark-antiquark ($t\bar{t}$) production can be used to extract $m_t$ in different renormalization schemes.

In this work, the pole mass of the top quark is measured using events in which the $t\bar{t}$ system is produced in association with one additional jet. This analysis is performed using proton-proton collision data collected by the CMS experiment in 2016-2018 with $\sqrt{s} = 13$ TeV, corresponding to a total integrated luminosity of 138 fb$^{-1}$. Events with two opposite-sign leptons in the final state are analyzed to measure the normalized differential cross section as a function of the inverse of the invariant mass of the $t\bar{t}$+1 jet system. This observable has been chosen due to strongest sensitivity to $m_t$ at the threshold of the $t\bar{t}$ pair production.

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