EVICENCE FOR A STANDARD MODEL HIGGS BOSON PRODUCED IN
ASSOCIATION WITH A TOP QUARK PAIR AND DECAYING TO
LEPTONS

A Dissertation

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by

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EVIDENCE FOR A STANDARD MODEL HIGGS BOSON PRODUCED IN ASSOCIATION WITH A TOP QUARK PAIR AND DECAYING TO LEPTONS

Abstract

by

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A search for the standard model Higgs boson produced in association with a top quark pair is presented, using the full pp collision dataset corresponding to an integrated luminosity of 35.9 fb^{-1} collected by the CMS experiment at a center of mass energy of $\sqrt{s} = 13$ TeV. MVA-based event reconstruction techniques are used to identify final states where the Higgs boson decays to either a W, Z or tau pair by selecting events with two isolated same-sign leptons, and b-jets. The observed best-fit t$\bar{\text{t}}$H signal strength is $1.7^{+0.6}_{-0.5}$ times the Standard Model prediction, corresponding to a significance of 3.3 standard deviations above the background-only hypothesis. The observed 95% CL upper limit on the signal strength is 2.9 times the Standard Model prediction, compared to the expected upper limit of $1.0^{+0.5}_{-0.3}$.

To my parents, Charles and Toni.

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