



# LHC Seminar

SPEAKER: Matthias Schroeder

TITLE: **CMS measurements (and interplay) of ttbb and ttH(H->bb) production cross sections at 13 TeV**

DATE: 25 Jun 2019, 11:00

PLACE: 222/R-001

## ABSTRACT

Two cross section measurements performed by the CMS collaboration using data from proton-proton collisions at 13 TeV will be discussed: the production of top quark pairs in association with two b jets (ttbb) and the production of top quark pairs in association with a standard model Higgs boson that decays to a b jet pair, ttH(H->bb). The production cross section of top quark pairs in association with two b jets is a major irreducible background in the measurement of ttH and its normalization and modelling are leading sources of systematic uncertainty. The first cross section measurement in the all-jet decay channel of the top quark pairs will be presented. The ttbb cross section is measured for the visible phase space, as well as for the full phase space, using 35.9 fb<sup>-1</sup> of data recorded by CMS in 2016. The measured cross sections are compared with predictions of several event generators and are found to be generally higher than the theoretical predictions. In the measurement of the ttH(H->bb) production cross section presented, all possible top quark pair final states are considered, and multivariate analysis techniques are employed to improve the discrimination between signal and tt-dominated backgrounds. Combining the data collected by CMS in 2016 and 2017 (35.9 fb<sup>-1</sup> + 41.5 fb<sup>-1</sup>) the best fit value of the ttH signal strength is found to be  $\mu = 1.15 \pm 0.15$  (stat)  $+0.28-0.25$  (syst), corresponding to an observed (expected) significance of 3.9 (3.5) standard deviations above the background-only hypothesis. This result improves upon previous CMS measurements in this channel thanks to the increase in integrated luminosity and the use of a more performant b tagging algorithm as well as refined analysis methods, and constitutes the first evidence for ttH production in the bb decay mode of the Higgs boson.

Organised by: M. Mangano, M. Pepe-Altarelli, G. Unal.....  
Refreshments will be served at 10h30