

Status report of tW production in the $e\mu$ channel

Sergio Sánchez Cruz for the tW WG



Universidad de Oviedo

28 June 2017

GOALS OF THE ANALYSIS AND DOCUMENTATION

- ▶ The goal of the analysis is to provide the first tW cross-section measurement at $\sqrt{s} = 13$ TeV in CMS
- ▶ Our aim is to release a PAS on the dileptonic channel in the TOP2017 timescale
- ▶ The ongoing analysis is being documented in AN2017-113

Single top associated tW production at 13 TeV

A. Bharadwaj², S. Chenarani⁴, J. Cuevas¹, J. R. González¹, D. Konstantinov³, E. Palencia¹, P. Priyanka², K. Ranjan², I. Razumov³, and S. Sánchez Cruz¹

¹ University of Oviedo, Spain

² University of Delhi, India

³ IHEP, Russia

⁴ School of Particles and Accelerators, IPM, Iran

ORGANIZATION

- ▶ Several groups involved in the effort: Oviedo, Delhi, IHEP, IPM
- ▶ Weekly working group meetings (Thursday 10:30)
- ▶ Contact person: [Enrique Palencia Cortezón](#)
- ▶ E-group: cms-tW-13TeV@cern.ch

DATASETS

- ▶ asdf

SELECTION

- ▶ Object and event selection borrowed from $t\bar{t}$ cross-section
- ▶ Lepton definition
 - ▶ Tight ID (POG) muons
 - ▶ Cut-based tight ID (POG) electrons
 - ▶ $p_T > 20$ GeV, $|\eta| < 2.4$
- ▶ Considering jets with $p_T > 30$ GeV, $|\eta| < 2.4$
- ▶ Data collected using single and double lepton triggers in TOP trigger twiki

ANALYSIS STRATEGY

- ▶ Using $e\mu$ channel only
- ▶ The aim is to define signal and control regions based on the number of jets and b-tags
- ▶ Further discrimination power in 1j1t and 2j1t regions provided by dedicated BDTs
- ▶ Signal extraction performed a likelihood fit to distributions in the different signal / control regions
- ▶ Main background ($t\bar{t}$) estimated using Monte Carlo simulations
- ▶ Non W/Z leptons estimated from a same-sign control region

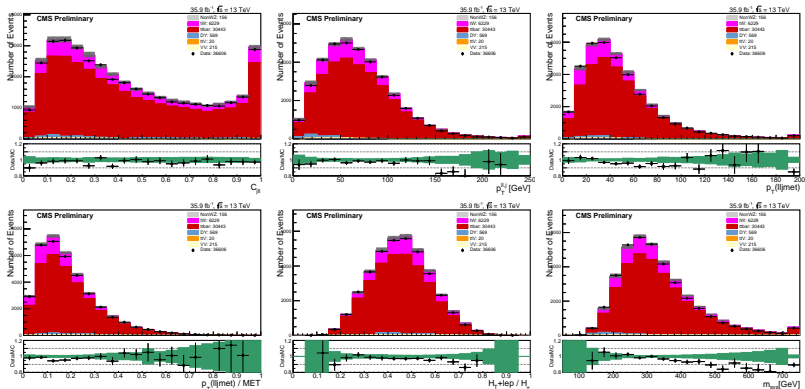
BACKGROUND ESTIMATION

Input needed from Priyanka

SIGNAL EXTRACTION

CATEGORY 1J1T

► Input variables



$$\text{► } C_{j, \ell\ell} = \frac{(\vec{p}^{\text{jet1}} + \vec{p}^{\text{lep1}} + \vec{p}^{\text{lep2}})_T}{|\vec{p}^{\text{jet1}} + \vec{p}^{\text{lep1}} + \vec{p}^{\text{lep2}}|}$$

$$\text{► } p_T(\ell\ell, \text{jet1})$$

$$\text{► } p_T(\ell\ell, \text{jet1}, \text{MET})$$

$$\text{► } \frac{p_T(\ell\ell, \text{jet1}, \text{MET})}{H_T}$$

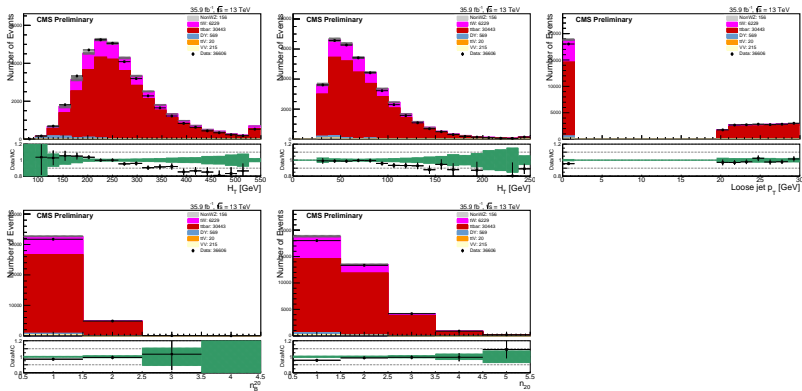
$$\text{► } \frac{\sum p_T^\ell}{H_T}$$

$$\text{► } M_{\text{sys}}$$

SIGNAL EXTRACTION

CATEGORY 1J1T

► Input variables



► H_T

► p_T^{jet1}

► $p_T^{loosejet}$

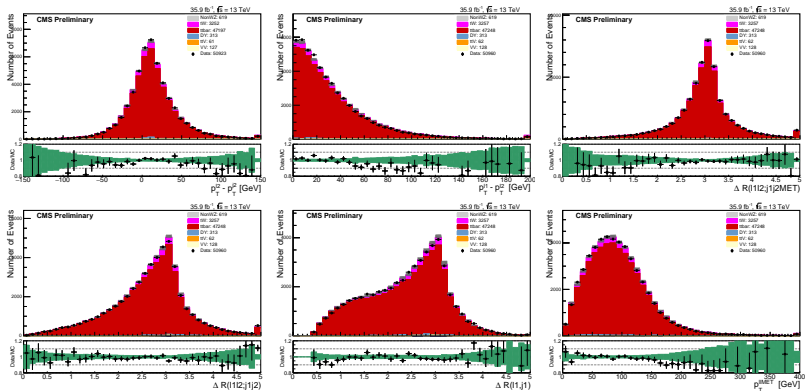
► n_B^{loose}

► n_{loose}

SIGNAL EXTRACTION

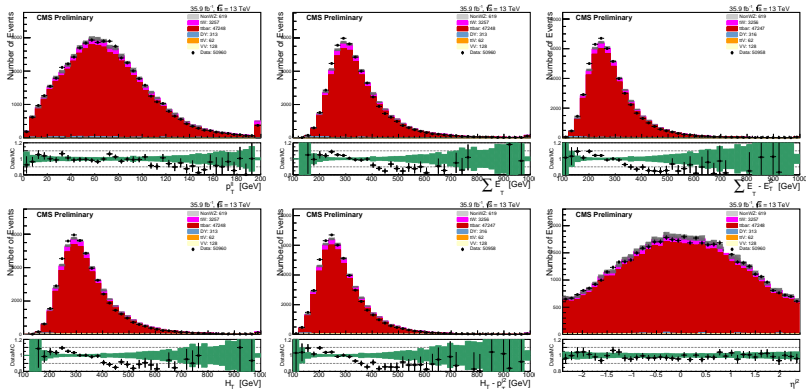
CATEGORY 2J1T

► Input variables



SIGNAL EXTRACTION

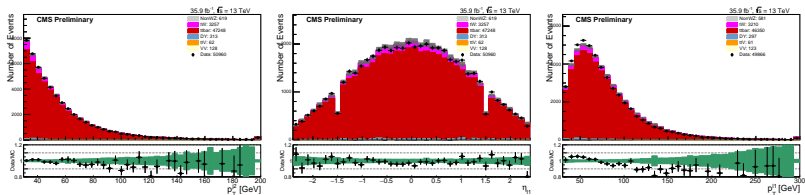
CATEGORY 2J1T



SIGNAL EXTRACTION

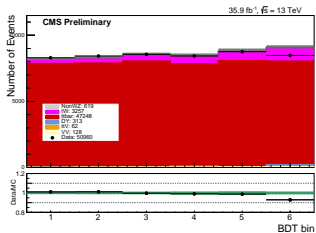
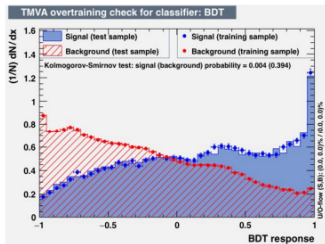
CATEGORY 2J1T

► Input variables



SIGNAL EXTRACTION

CATEGORY 2J1T



- ▶ Small underfluctuation in the highest significance bin
- ▶ Still investigating this, probably some changes will be made to this BDT

PRELIMINARY RESULTS

CONCLUSIONS

Back-up