

## T 108: Top, EW I

Time: Thursday 15:50–17:20

Location: HSZ/0103

T 108.1 Thu 15:50 HSZ/0103

**Towards a WbWb differential cross-section measurement** — ●ELEONORA LOIACONO for the ATLAS-Collaboration — DESY Campus Zeuthen

The production of a top quark pair is extensively studied at the Large Hadron Collider (LHC). It constitutes a significant background in many searches for physics Beyond the Standard Model (BSM). The final state of this process, WWbb, interferes with the production of a single top quark in association with a W boson at Next Leading Order (tWb). In this contribution, I will focus on presenting different techniques that are used to correct the data for inefficiencies and limited geometric acceptance for the WWbb single lepton channel, with the goal of improving the modelling of Standard Model (SM) processes for BSM searches. First differential cross-section measurements in variables that are maximally sensitive to the interference, using data from second run of the LHC, will be presented.

T 108.2 Thu 16:05 HSZ/0103

**Towards a WbWb differential cross-section measurement in a search-like phase space** — ●THOMAS MCLACHLAN for the ATLAS-Collaboration — DESY

Top quark pair production is a widely studied process at the Large Hadron Collider (LHC) and is a significant background in many searches beyond the Standard Model (BSM). The WbWb final states of this process interfere with the production of a single top quark in association with a W boson and a b-quark (tWb). Inspired by searches for supersymmetry and dark matter, I will measure the WbWb production cross-section in a search-like phase space that is maximally sensitive to the interference effects. Performing such a measurement can allow for new constraints on new physics and improve the sensitivity of future searches through improved background modelling. An event selection using single lepton events has been developed and will be used on the entire Run 2 dataset. In this context, I will present a range of quantities and theoretical parameters that will be used in the differential cross-section measurement.

T 108.3 Thu 16:20 HSZ/0103

**Measurement of differential cross sections in the process  $pp \rightarrow W^+W^-b\bar{b}$**  — STEFAN KLUTH, DANIEL BRITZGER, and ●JOHANNES HESSLER — Max-Planck-Institut für Physik

Precise measurements of differential cross sections in the process  $pp \rightarrow W^+W^-b\bar{b}$  offer an outstandingly rich physics potential at highest precision. Although the process is theoretically and experimentally well defined, dedicated measurements of  $W^+W^-b\bar{b}$  production cross sections were not (extensively) performed in the past at the LHC. We will report on ongoing measurements in the single-lepton channel with Run-II data taken by the ATLAS experiment. Due to the high jet multiplicity of the final state the event reconstruction can be challenging. This talk will focus on the kinematic reconstruction of the hadronically decaying W-boson.

T 108.4 Thu 16:35 HSZ/0103

**Measurement of the differential  $W \rightarrow e\nu$  cross section at high transverse masses with the ATLAS detector and its combination with the  $W \rightarrow \mu\nu$  channel** — FRANK ELLINGHAUS, JOHANNA WANDA KRAUS, and ●TIM FREDERIK BEUMKER — Bergische Universität Wuppertal

A measurement of the differential cross section of the process  $W \rightarrow e\nu$  is shown. The data set used is based on pp-collision data corresponding to an integrated luminosity of  $\mathcal{L} = 139 \text{ fb}^{-1}$  at a center-of-mass energy of  $\sqrt{s} = 13 \text{ TeV}$ . It was recorded with the ATLAS detector during LHC Run-2. The measurement is done double-differentially in the transverse mass of the W boson and the absolute of the pseudorapidity of the electron. It focuses on the region of high transverse masses above 200 GeV. The results will allow constraints on effective field theories and parton distribution functions of the proton. An overview of the analysis with a focus on the determination of the multijet background will be given. In addition, a combination with the associated  $W \rightarrow \mu\nu$  measurement using the HAVERAGER tool will be presented.

T 108.5 Thu 16:50 HSZ/0103

**Measurement of the differential  $W \rightarrow \mu\nu$  cross section at high transverse masses at  $\sqrt{s} = 13 \text{ TeV}$  with the ATLAS detector** — FRANK ELLINGHAUS and ●JOHANNA WANDA KRAUS — Bergische Universität Wuppertal

The measurement of the differential cross section of the charged-current Drell-Yan process in the decay  $W \rightarrow \mu\nu$  is presented. It is based on pp-collision data taken with the ATLAS detector during the LHC Run-2 at a center-of-mass energy of  $\sqrt{s} = 13 \text{ TeV}$ , corresponding to an integrated luminosity of  $\mathcal{L} = 139 \text{ fb}^{-1}$ . The cross section is measured double-differentially as a function of the transverse mass  $m_T^W$  and the pseudorapidity of the muon with a focus on the high transverse mass region above 200 GeV. This is done for the first time and will allow for constraints on the parton distribution functions of the proton and on effective field theories. A short overview of the complete analysis will be given with a focus on studies of the unfolding procedure via Iterative Bayesian Unfolding.

T 108.6 Thu 17:05 HSZ/0103

**Measurement of the inclusive W and Z boson production cross sections in pp collisions at 13.6 TeV** — ●JOST VON DEN DRIESCH, MARKUS KLUTE, MINSEOK OH, and XUNWU ZUO — Karlsruhe Institute of Technology (KIT)

The measurement of the W and Z boson production cross sections and their ratios provides an important test of quantum chromodynamics and electroweak processes in the Standard Model. Such measurements have been previously performed by the ATLAS and CMS collaborations at LHC collision energies of  $\sqrt{s} = 7 \text{ TeV}$ ,  $8 \text{ TeV}$  and  $13 \text{ TeV}$ . This talk will provide an overview on the results of the W and Z production cross section measurement at CMS using Early Run3 data at the new collision energy of  $\sqrt{s} = 13.6 \text{ TeV}$ .