

ATLAS CZ+SK 2019 Workshop

Report of Contributions

Contribution ID: 3

Type: **not specified**

Direct measurement of the top-quark decay width

Tuesday, June 25, 2019 10:50 AM (20 minutes)

A direct measurement of the top-quark decay width using full Run 2 dataset will be presented. The measurement exploits both lepton+jets and dilepton decays of the $t\bar{t}$ pairs. A modified version of a profile likelihood technique has been developed to incorporate multiple templates to extract the decay width. The modification as well as various cross-checks that have been done to validate the technique will be presented.

Primary author: DADO, Tomas (Comenius University (SK))

Presenter: DADO, Tomas (Comenius University (SK))

Contribution ID: 4

Type: **not specified**

Charge asymmetry in top-quark pair production at 13 TeV in proton-proton collisions with the ATLAS experiment

Tuesday, June 25, 2019 9:25 AM (20 minutes)

We report a measurement of the charge asymmetry in top quark pair production using 139 fb^{-1} of proton-proton collision data collected at the centre-of-mass energy of 13 TeV by the ATLAS experiment.

Events are reconstructed in the so-called resolved topology and in a topology with highly boosted top quarks.

Both topologies are combined and a fully bayesian unfolding method is used to correct for limited detector acceptance and resolution.

The charge asymmetry is measured inclusively and differentially as a function of the top quark pair mass and longitudinal boost.

The measured values are in good agreement with the Standard Model NLO predictions and a non-zero inclusive asymmetry is observed at a 4 sigma confidence level.

Primary authors: MELO, Matej (Comenius University (SK)); MAJERSKY, Oliver (Comenius University (SK)); ECKEROVA, Barbora (Comenius University (SK)); DADO, Tomas (Comenius University (SK)); BARTOS, Pavol (Comenius University (SK)); TOKAR, Stano (Comenius University (SK))

Presenter: MELO, Matej (Comenius University (SK))

Contribution ID: 5

Type: **not specified**

Space-time model for colour reconnection in Herwig7.

Monday, June 24, 2019 9:50 AM (20 minutes)

The idea behind the space-time colour reconnection is to use the space-time distance between the partons to construct a colour reconnection model. We will describe how the space-time picture is incorporated into Herwig 7 and show the first results of a space-time CR model.

Primary author: MYSKA, Miroslav (Czech Technical University (CZ))

Presenter: MYSKA, Miroslav (Czech Technical University (CZ))

Contribution ID: 6

Type: **not specified**

Prospect of $t\bar{t}$ charge asymmetry measurement in boosted all-hadronic channel

Tuesday, June 25, 2019 9:05 AM (20 minutes)

The $t\bar{t}$ charge asymmetry at ATLAS has traditionally been measured in single-lepton and di-lepton channels. This is primarily due to the necessity to identify the charge of the reconstructed top/anti-top quarks. The charge of the lepton acts as a proxy to the charge of the corresponding leptonically-decaying top. We investigate the possibility of a measurement of the $t\bar{t}$ charge asymmetry in boosted all-hadronic channel by using neural networks and tracking information to distinguish top quarks from anti-top quarks.

Primary author: MAJERSKY, Oliver (Comenius University (SK))

Presenter: MAJERSKY, Oliver (Comenius University (SK))

Contribution ID: 7

Type: **not specified**

Measurement of the Higgs boson cross section in decays to tau leptons

Tuesday, June 25, 2019 12:10 PM (20 minutes)

Measurements with the Higgs boson decaying into tau leptons represent an important tool to test the SM and open up a window for discovery of potential new physics. In the talk, I will give a summary of the recent measurement of the Higgs cross section done with 2015+2016 data. I will continue with a report on the status of the ongoing analysis with the full Run 2 dataset.

Primary author: SCHEIRICH, Daniel (Charles University (CZ))

Presenter: SCHEIRICH, Daniel (Charles University (CZ))

Contribution ID: 8

Type: **not specified**

H $\rightarrow\tau\tau$ analysis with ATLAS experiment: status and objectives

Tuesday, June 25, 2019 12:30 PM (20 minutes)

Analysis of Standard Model Higgs boson decays to a pair of τ -leptons is currently performed by the ATLAS experiment with full data set collected in Run 2. Among many aims of the analysis, there are precise measurement of Higgs Boson properties, coupling to tau-leptons, cross section in the corresponding decay channel.

The talk will explain the analysis strategy. The focus will be given to event selection procedure and its revisiting, as well as object reconstruction. The status and developments of the main mass estimation technique (Missing Mass Calculator) will be presented.

The outlook at the observed significance of the H $\rightarrow\tau\tau$ signal over the expected background will be given. The results on total cross section in H $\rightarrow\tau\tau$ decay channel using data at $\sqrt{s}=13$ TeV will be also discussed.

Primary author: PETUKHOVA, Krystsina (Charles University (CZ))

Presenter: PETUKHOVA, Krystsina (Charles University (CZ))

Contribution ID: 9

Type: **not specified**

Finite Mass Electroweak Monopole from braneworld

Monday, June 24, 2019 11:10 AM (30 minutes)

A mini-realistic brane-world scenario with a single domain wall in five-dimensional spacetime is presented. The brane is modeled via a topological soliton (domain wall), which exhibits a phase transition. At the critical point, the Higgs field condenses on the brane and i) breaks spontaneously electroweak symmetry, ii) localizes gauge fields, iii) gives mass to fermions in the standard way. All this is achieved at the electroweak scale, protected from extra-dimensional scale by a large gap. There are two unexpected and inherent bonuses to this model: first, a tree level signal of new physics in $H \rightarrow \gamma\gamma$ decay channel and, second, a finite mass electroweak monopole.

Primary author: BLASCHKE, Filip

Presenter: BLASCHKE, Filip

Contribution ID: 10

Type: **not specified**

Differential cross-section measurement of the associated production of a top-quark pair and a Z boson

Monday, June 24, 2019 4:40 PM (20 minutes)

Increasing center-of-mass energy of \sqrt{s} collisions and higher luminosity at the LHC enables us to study rare processes of the Standard Model. This analysis uses full Run 2 data with total integrated luminosity of 139 fb^{-1} for the first differential measurement of $t\bar{t}$ production cross-section at the ATLAS experiment. The methodology of the measurement is based on the Iterative Bayesian Unfolding (IBU). This method, which is based on Bayes' theorem, does not require matrix inversion and is theoretically well grounded. Together with iterative approach, the IBU ensures relatively fast and stable convergence to final unfolded distribution. The preliminary results for tetralepton signature, where 4 leptons are identified in the final state (dileptonic decay of top-quark pair and leptonic decay of Z boson to two charged leptons), will be presented.

Primary authors: BABAL, Dominik (Comenius University (SK)); DUBOVSKY, Michal (Comenius University (SK)); RACKO, Michal (Comenius University (SK)); BARTOS, Pavol (Comenius University (SK))

Presenter: BABAL, Dominik (Comenius University (SK))

Contribution ID: 11

Type: **not specified**

A case study of the LHC mass exclusion limits for the BSM vector resonances

Monday, June 24, 2019 12:10 PM (20 minutes)

The ongoing LHC measurements searching for heavy resonances beyond the Standard model set upper bounds on their production cross sections in various decay channels. These upper bounds can be used to derive the mass exclusion limits for the new resonances. In our work, we investigate the mass exclusion limits for the new vector resonances of strongly coupled extensions of the Standard model which interact directly to the third quark generation only.

Primary authors: JURAN, Josef (Czech Technical University (CZ)); GINTNER, Mikulas (University of Zilina (SK))

Presenter: JURAN, Josef (Czech Technical University (CZ))

Contribution ID: 12

Type: **not specified**

Top quark spin correlation variables

Monday, June 24, 2019 4:00 PM (20 minutes)

Study of spin correlation variables in $t\bar{t}$ dilepton channel using full Run2 data with total integrated luminosity 139fb^{-1} . After event selection by AnalysisTop-21.2.58 $t\bar{t}$ kinematic variables were reconstructed by KinReco method.

Primary authors: SOPKOVA, Filomena (Slovak Academy of Sciences (SK)); BRUNCKO, Dusan (Slovak Academy of Sciences (SK)); LYSAK, Roman (Acad. of Sciences of the Czech Rep. (CZ)); STRIZENEC, Pavol (Slovak Academy of Sciences (SK)); URBAN, Josef (Slovak Academy of Sciences (SK))

Presenter: SOPKOVA, Filomena (Slovak Academy of Sciences (SK))

Contribution ID: 13

Type: **not specified**

Differential cross-section measurements of highly boosted top quark pairs in all-hadronic channel

Tuesday, June 25, 2019 8:45 AM (20 minutes)

Measurements are made of differential cross-sections of highly boosted pair-produced top quarks as a function of top-quark and $t\bar{t}$ system kinematic observables using proton-proton collisions at a center-of-mass energy of $\sqrt{s}=13$ TeV. Events with hadronically decaying pairs of top quarks are selected by requiring two large-radius jets in the final state, one with transverse momentum $p_T > 500$ GeV and a second with $p_T > 350$ GeV and separated from background using top-tagging and b-tagging. This measurement is performed using the full Run 2 dataset corresponding to an integrated luminosity of 139 fb^{-1} .

Primary authors: JACKA, Petr (Acad. of Sciences of the Czech Rep. (CZ)); HEJBAL, Jiri (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: HEJBAL, Jiri (Acad. of Sciences of the Czech Rep. (CZ))

Contribution ID: 14

Type: **not specified**

Application of the Fully Bayesian Unfolding in the top pair charge asymmetry measurement

Tuesday, June 25, 2019 9:45 AM (20 minutes)

Measurements of top quark properties provide possibilities to test the Standard Model predictions and probe BSM scenarios.

Top quark pair production charge asymmetry, $A_C^{t\bar{t}}$, manifests itself as asymmetry in the differential cross section under the exchange of t and \bar{t} quark in the final state. In the SM, $A_C^{t\bar{t}}$ is zero at LO calculation and is non-zero in higher order corrections. Thus, charge asymmetry is sensitive to possible BSM contributions.

To correct for detector and reconstruction response, an unfolding procedure is applied to measured data.

Due to large amount of data collected in Run~2, systematic uncertainties have significant impact on precision of the measurement.

The technique of the Fully Bayesian Unfolding (FBU), which allows natural inclusion of systematic uncertainties via nuisance parameters, is employed. The FBU implementation is presented in the context of the Run~2 $t\bar{t}$ charge asymmetry measurement.

Primary author: ECKEROVA, Barbora (Comenius University (SK))

Presenter: ECKEROVA, Barbora (Comenius University (SK))

Contribution ID: 15

Type: **not specified**

First look at photon-induced interactions

LHC could be seen as $\gamma+\gamma$ collider, because of high photon fluxes, which highly boosted protons radiate. As SM predicts, the rare collision between two photons needs to be mediated by some other object (l, q, W^\pm). The talk gives a short description of, how such things could be modeled, using the FPMC (Forward Physics Monte Carlo) generator and how it could be measured using ATLAS&AFP detector systems.

Primary author: Mr GANCARCIK, David (Czech Technical University (CZ))

Presenter: Mr GANCARCIK, David (Czech Technical University (CZ))

Contribution ID: 16

Type: **not specified**

Bose–Einstein correlations in proton–proton collisions at $\sqrt{s} = 8$ TeV in the ATLAS experiment

Multidimensional and one-dimensional Bose–Einstein correlations (BEC) are measured in proton–proton collisions at $\sqrt{s} = 8$ TeV with the ATLAS detector at the LHC. The BEC are the correlations between two identical bosons (a consequence of the symmetry of identical bosons wave function). In particle physics, through a detailed study of the two-particle Bose-Einstein correlations, one can determine the spatial and temporal characteristics of the boson source that make it possible to analyze the characteristics of the hadronization region and allow the determination of the size and shape of the source, which particles are emitted from. The studies of the dependence of BEC on the particle multiplicity n_{sel} are of particular interest, because they help in the understanding the multiparticle production mechanisms. The correlation functions are extracted in terms of different components of the relative momentum of the pair, in order to investigate the extension of the emission source in different directions. Correlation radii R and chaoticity parameter λ are determined for different regions of charged-particle multiplicity using a double-ratio technique and exponential parametrization of the correlation function C_2 . The results are presented for different intervals of particle multiplicity n_{sel} of the collision. The radii of the source increase with increasing multiplicity and chaoticity parameter decreases with increasing multiplicity which is consistent with the theory.

Primary author: HYRYCH, Sofia (Comenius University (SK))

Co-authors: SYKORA, Ivan (Comenius University (SK)); ASTALOS, Robert (Comenius University (SK)); TOKAR, Stano (Comenius University (SK)); ZENIS, Tibor (Comenius University (SK))

Presenter: HYRYCH, Sofia (Comenius University (SK))

Contribution ID: 17

Type: **not specified**

Intrinsic Charm in Proton

Monday, June 24, 2019 3:00 PM (20 minutes)

Despite rather long-term theoretical and experimental study, the hypothesis of the nonzero intrinsic (valence like) heavy quark component of the proton distribution functions has not yet been resolved. The LHC with its \sqrt{s} collisions at $\sqrt{s} = 7 - 14$ TeV offers new insights into the structure of the proton. Using the first ATLAS data on the associated production of prompt photons and charm-quark jets in \sqrt{s} collisions at $\sqrt{s} = 8$ TeV the constrain on possible intrinsic charm is determined. The upper limit on intrinsic charm probability $\chi < 1.97\%$ is obtained at the 68% confidence level along with predictions for the possible $\sqrt{s} = 13$ TeV measurement.

Primary author: SMIESKO, Juraj (Comenius University (SK))

Presenter: SMIESKO, Juraj (Comenius University (SK))

Contribution ID: 18

Type: **not specified**

Study of the semi-boosted topology in top anti-top pair spectra in the semi-leptonic decay channel using the hypothetical particle Z' as a probe.

Monday, June 24, 2019 5:20 PM (20 minutes)

The study describes effects in top anti-top pair spectra by incorporating the semi-boosted topology in the resolved and boosted analysis. Addition of this topology could improve efficiency in now often omitted range of top quark momenta. The resolution of the top anti-top system mass is also studied as function of the Z' mass, corresponding to mass of the reconstructed top anti-top system. The resolution of top anti-top system mass is also studied and present in this contribution.

Primary author: PACALT, Josef (Palacky University (CZ))

Presenter: PACALT, Josef (Palacky University (CZ))

Contribution ID: 19

Type: **not specified**

Lifetimes studies in B-Physics

Tuesday, June 25, 2019 11:50 AM (20 minutes)

The B-Physics working group is studying various properties of B hadrons which includes lifetime measurement. The most sensitive analysis is CP violation in $B_s^0 \rightarrow J/\psi\phi$ which is closely related to the precise estimation of its lifetime. This require understanding of the lifetime behavior of various triggers along the data taking in the simpler system such as $B^\pm \rightarrow J/\psi K^\pm$ or $B_d^0 \rightarrow J/\psi K^*$. This talk will be focused on the procedure of the lifetime estimation and the preliminary results.

Primary author: NOVOTNY, Radek (Czech Technical University (CZ))

Presenter: NOVOTNY, Radek (Czech Technical University (CZ))

Contribution ID: 20

Type: **not specified**

Magnetic monopole mass

Monday, June 24, 2019 9:15 AM (35 minutes)

After a short general introduction to the theory of magnetic monopoles, with an emphasis on their masses within different models, I will focus specifically on the electroweak Cho-Maison magnetic monopole and present some exact monopole solutions in effective extensions of the Standard Model that have a Bogomol'nyi-Prasad-Sommerfield (BPS) limit. I'll show that the phenomenologically relevant lower bound to the mass of the magnetic monopole is $M \geq 2\pi v/g \approx 2.37$ TeV. I'll argue that this bound holds universally, not just in theories with a BPS limit.

Primary author: BENES, Petr (Czech Technical University (CZ))

Presenter: BENES, Petr (Czech Technical University (CZ))

Contribution ID: 21

Type: **not specified**

Vector Boson Scattering

Monday, June 24, 2019 2:00 PM (20 minutes)

The search for the Vector Boson Scattering phenomena is a leading edge analysis in particle physics at ATLAS at CERN. We are focused on ZZ channel and present the search for the electroweak production of two Z bosons in association with two jets and measurement of the cross section in the VBS enhanced phase-space. The analysis processes the whole dataset of Run 2 period of LHC operation.

Primary author: PENC, Ondrej (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: PENC, Ondrej (Acad. of Sciences of the Czech Rep. (CZ))

Contribution ID: 22

Type: **not specified**

Homogeneity tests of weighted samples in ROOT

Monday, June 24, 2019 10:50 AM (20 minutes)

An important part of data analysis is to verify whether measured data have the same distribution as a simulated MC sample. One of several methods of verification is homogeneity testing. MC samples are usually weighted and therefore homogeneity tests must be generalized. In ROOT, some homogeneity tests of weighted samples are implemented; however, none of them performs well. Moreover, they are limited to be applicable only to binned data samples. Therefore, we implemented several tests in ROOT: Kolmogorov-Smirnov, Cramér-von Mises, and Anderson-Darling which use complete samples' information. Asymptotic properties of these modified tests are compared in a simulation.

Primary author: TRUSINA, Jakub (Czech Technical University (CZ))

Co-author: FRANC, Jiri (Czech Technical University (CZ))

Presenter: TRUSINA, Jakub (Czech Technical University (CZ))

Contribution ID: 23

Type: **not specified**

Total cross section measurement of the ttZ with full Run II dataset

Monday, June 24, 2019 4:20 PM (20 minutes)

After publishing the first observation of the ttZ process at ATLAS with 36/fb of data, a more precise measurement of the ttZ total cross section, as well as the differential cross section measurement, will follow with the full Run II LHC dataset. 3 and 4 lepton final states are included in the measurement, aiming for a publication for one of the summer conferences. The measurement will be presented mostly from the total cross section point of view in the 4-lepton channel.

Primary author: DUBOVSKY, Michal (Comenius University (SK))

Presenter: DUBOVSKY, Michal (Comenius University (SK))

Contribution ID: 24

Type: **not specified**

B-Physics studies for ATLAS Upgrade

Tuesday, June 25, 2019 11:10 AM (20 minutes)

Precise measurements of b-harons production and decays have potential in revealing possible effects of New Physics by observations of deviations from the Standard Model predictions. ATLAS experiment has a wide B-physics program, which is expected to continue at the High Luminosity LHC and the upgraded ATLAS detector. This talk will review the recent estimates of the performance of the key B-physics analyses at the HL-LHC phase.

Primary author: REZNICEK, Pavel (Charles University (CZ))

Presenter: REZNICEK, Pavel (Charles University (CZ))

Contribution ID: 25

Type: **not specified**

Heavy ion collisions at ATLAS

Monday, June 24, 2019 11:40 AM (30 minutes)

TBA

Primary author: SPOUSTA, Martin (Charles University)

Presenter: SPOUSTA, Martin (Charles University)

Contribution ID: 26

Type: **not specified**

Future accelerators in Europe

Monday, June 24, 2019 8:45 AM (30 minutes)

TBA

Primary author: KUPCO, Alexander (Institute of Physics of the Czech Academy of Sciences)

Presenter: KUPCO, Alexander (Institute of Physics of the Czech Academy of Sciences)

Contribution ID: 27

Type: **not specified**

Studies of the uncertainty on lepton isolation efficiency

Monday, June 24, 2019 5:00 PM (20 minutes)

The isolation requirement on leptons is one of the basic selection criteria applied by nearly all analyses studying top-quark decays resulting in one or more leptons in their final state. Scale factors used to account for the difference in the isolation efficiency between Data and Monte Carlo were derived using $Z \rightarrow \ell\ell$ events, characteristic by their low jet multiplicities, and extrapolated to other Monte Carlo samples with various lepton and jet multiplicities. The goal of this project is to evaluate the systematic uncertainty caused by this extrapolation in the $t\bar{t}Z$ cross-section measurement and to prepare a general framework for derivation of new scale factors and uncertainties. Isolation efficiency in various p_T^e , p_T^μ , N_{jets} and μ slices was compared among various Monte Carlo samples and campaigns to evaluate the uncertainty. Effect of the order of 5% was observed and ongoing work is being done to compare the difference to the corresponding systematic uncertainties and to evaluate the need for additional scale factors and uncertainties in the $t\bar{t}Z$ cross-section analysis.

Primary author: RACKO, Michal (Comenius University (SK))

Presenter: RACKO, Michal (Comenius University (SK))

Contribution ID: 28

Type: **not specified**

Measurement of the CP-violating phase $\phi(s)$ with Bs decays

Tuesday, June 25, 2019 11:30 AM (20 minutes)

The CP violating phase ϕ_S arises in the interference between the amplitudes of B_s^0 mesons decaying via $b \rightarrow s$ transition and those decaying after oscillation. The flavour tagging methods of B_s^0 has significant impact on the precision of the ϕ_s phase studies.

This talk will be focused on the procedure of the calibration of opposite side tagging method using B^\pm decays and its implementation into the $B_s^0 \rightarrow J/\psi\phi$ measurements.

Primary author: NOVOTNY, Lukas (Czech Technical University (CZ))

Presenter: NOVOTNY, Lukas (Czech Technical University (CZ))

Contribution ID: 29

Type: **not specified**

AFP Status and Prospects

Monday, June 24, 2019 2:20 PM (20 minutes)

The ATLAS Forward Proton (AFP) detectors since their installation in 2016 performed efficient to the data taking during the 2017 (RUN2) and they will participate at the upcoming RUN3 data taking also. In this talk the performance of the detectors will be unfolded, from the physics to the detectors including also the Time of Flight (ToF). We will discuss the upcoming challenging perspectives looking for Beyond Standard Model Physics, from Dark Matter searches and anomalous Quartic Gauge Couplings (aQGC) to the High Luminosity LHC (HL-LHC) era.

Primary author: Dr PETOUSIS, Vlasios (Czech Technical University (CZ))

Presenter: Dr PETOUSIS, Vlasios (Czech Technical University (CZ))

Contribution ID: 30

Type: **not specified**

Fake-Rate Determination for the ttH Coupling Measurement with a Signature of Two Same Electric Charge Light Leptons Associated with a Tau Using the ATLAS Detector at the LHC

Monday, June 24, 2019 2:40 PM (20 minutes)

After the discovery of a Higgs boson, the measurements of its properties are at the forefront of research. The determination of the associated production of a Higgs boson and a pair of top quarks is of particular importance as the ttH Yukawa coupling is large and can probe for physics beyond the Standard Model. The analysis is based on data taken by the ATLAS experiment recorded from 13 TeV proton-proton collisions. The ttH production was analyzed in various final states. The focus of this presentation is on the fake rate determination in the final state with two light leptons of same electric charge and one hadronically decaying tau lepton.

Primary author: MONDAL, Santu (Czech Technical University (CZ))

Presenter: MONDAL, Santu (Czech Technical University (CZ))