

XXVI International Workshop on Deep Inelastic Scattering and Related Subjects



Report of Contributions

Contribution ID: 6

Type: **not specified**

Determination of the strong coupling constant $\alpha_s(M_Z)$ in next-to-next-to-leading order QCD using H1 jet cross section measurements

Tuesday, April 17, 2018 9:00 AM (20 minutes)

The strong coupling constant $\alpha_s(m_Z)$ is determined from inclusive jet and dijet cross sections in neutral-current deep-inelastic ep scattering (DIS) measured at HERA by the H1 collaboration using next-to-next-to-leading order (NNLO) QCD predictions. The dependence of the NNLO predictions and of the resulting value of $\alpha_s(m_Z)$ at the Z-boson mass m_Z are studied as a function of the choice of the renormalisation and factorisation scales. Using inclusive jet and dijet data together, the strong coupling constant is determined to be $\alpha_s(m_Z) = 0.1157 (20)_{exp} (29)_{th}$. Complementary, $\alpha_s(m_Z)$ is determined together with parton distribution functions of the proton (PDFs) from jet and inclusive DIS data measured by the H1 experiment. The value $\alpha_s(m_Z) = 0.1142 (28)_{tot}$ obtained is consistent with the determination from jet data alone. The impact of the jet data on the PDFs is studied. The running of the strong coupling is tested at different values of the renormalisation scale and the results are found to be in agreement with expectations.

Eur.Phys.J.C77 (2017), 791 [arxiv:1709.07251]

Primary author: ZLEBICKI, Radek (Deutsches Elektronen-Synchrotron (DE))

Co-authors: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE)); GEHRMANN, Thomas (Univ. Zurich); H1, Collaboration (DESY)

Presenter: ZLEBICKI, Radek (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 7

Type: **not specified**

Heavy quark mass effects in associated production

Tuesday, April 17, 2018 3:20 PM (20 minutes)

In this talk we introduce a newly developed scheme based on an extension of the 5F flavour scheme, which treats b quarks as massless partons, to include full heavy quark mass dependency. We name this extension five-flavour massive scheme. We implement this scheme at MC@NLO accuracy in Sherpa. We present some results, obtained in this scheme, for b quarks produced in association with a vector boson or a Higgs boson.

Primary authors: NAPOLETANO, Davide (IPhT, Saclay); KRAUSS, Frank (IPPP, Durham)

Presenter: NAPOLETANO, Davide (IPhT, Saclay)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 8

Type: **not specified**

Production of transversely polarized Λ hyperon from unpolarized quark fragmentation in the diquark model

Wednesday, April 18, 2018 3:10 PM (20 minutes)

We investigate the spin-dependent (naive) T-odd fragmentation function D_{1T}^\perp , which can provide an explanation on the transverse polarization of the Λ^0 hyperon produced in an unpolarized process. We calculate D_{1T}^\perp for light flavors in the spectator diquark model, with a Gaussian form factor at the hyperon-quark-diquark vertex. We include in the calculation both the scalar diquark and axial-vector diquark spectators. We determine the values of the model parameters by fitting the unpolarized fragmentation function D_1^Λ to the DSV parametrization for D_1^Λ . In addition, we compute the longitudinal polarization fragmentation function G_1^Λ and compare it with the known parametrization of G_1^Λ . We also estimate the transverse polarizations of Λ production, in both semi-inclusive deep inelastic scattering and single inclusive e^+e^- annihilation.

Primary authors: Mr YANG, Yongliang (Southeast University); Prof. LU, Zhun (Southeast University); Prof. SCHMIDT, Ivan (Universidad Tecnica Federico Santa Maria)

Presenter: Mr YANG, Yongliang (Southeast University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 10

Type: **not specified**

[Cancelled] Leptonic Current Structure and Azimuthal Asymmetry in Deeply Inelastic Scattering

To simplify the calculation of DIS processes, many papers employed a form of the leptonic tensor which will lead to wrong results when the transverse momentum or rapidity of a final-state hadron is measured in the laboratory frame. Among these papers are there some highly cited ones and those employed by the event generators. To this end, many experimental data need to be reanalysed. I will review this issue and provide the correct form of the leptonic tensor, which can also simplify the calculation.

Primary author: ZHANG, Hong-Fei

Presenter: ZHANG, Hong-Fei

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 11

Type: **not specified**

[Cancelled] The color-singlet J/ψ production in DIS at HERA

We present the first study of the color-singlet (CS) J/ψ leptonproduction at QCD next-to-leading order (NLO). This process is extremely difficult. The CS J/ψ hadroproduction at NLO was studied in 2007, ten years has passed since then, the study of the J/ψ leptonproduction at NLO was missing until we finished this work in May, 2017. This talk will present our results, and discuss its phenomenological aspects.

Primary author: ZHANG, Hong-Fei

Presenter: ZHANG, Hong-Fei

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 13

Type: **not specified**

Double Higgs searches with Run 2 data at CMS

Wednesday, April 18, 2018 12:10 PM (20 minutes)

Results from double Higgs production with the CMS experiment are reviewed.

Co-author: CMS COLLABORATION

Presenter: Dr ORTONA, Giacomo (Centre National de la Recherche Scientifique (FR))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 14

Type: **not specified**

Measurements of Higgs differential cross-sections at CMS

Wednesday, April 18, 2018 9:00 AM (20 minutes)

Results on Higgs differential cross-sections measurements at CMS are reviewed.

Primary author: ORTONA, Giacomo (Centre National de la Recherche Scientifique (FR))

Co-author: CMS COLLABORATION

Presenter: ORTONA, Giacomo (Centre National de la Recherche Scientifique (FR))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 15

Type: **not specified**

Searches for ttH production at CMS

Tuesday, April 17, 2018 11:30 AM (20 minutes)

Recent results on associated top Higgs production at CMS are reviewed.

Primary author: NAYAK, Aruna (National Institute of Science Education and Research (IN))

Co-author: CMS COLLABORATION

Presenter: NAYAK, Aruna (National Institute of Science Education and Research (IN))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 16

Type: **not specified**

Searches for additional Higgs bosons at CMS with Run 2 data

Thursday, April 19, 2018 9:40 AM (20 minutes)

Searches for additional scalar bosons with the Run 2 data at CMS are reviewed.

Primary author: BRANDSTETTER, Johannes (Austrian Academy of Sciences (AT))

Co-author: CMS COLLABORATION

Presenter: BRANDSTETTER, Johannes (Austrian Academy of Sciences (AT))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 17

Type: **not specified**

Differential jet cross sections at the CMS experiment

Wednesday, April 18, 2018 10:00 AM (25 minutes)

We present measurements of differential jet cross sections over a wide range in transverse momenta from inclusive jets to multi-jet final states. Studies on the impact that these measurements have on the determination of the strong coupling α_s as well as on parton density functions are reported.

Primary author: KAUR, Anterpreet (Panjab University (IN))

Co-author: CMS COLLABORATION

Presenter: KAUR, Anterpreet (Panjab University (IN))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 18

Type: **not specified**

Vector Boson production in association with jets at CMS

Wednesday, April 18, 2018 11:55 AM (25 minutes)

The production of vector bosons (W, Z, gamma) in association with jets is a stringent test of perturbative QCD and is a background process in searches for new physics. Total and differential cross-section measurements of vector bosons produced in association with jets in proton-proton collisions performed by the CMS collaboration at the LHC are presented. The measurements are compared to the predictions of event generators and theoretical calculations.

Primary author: GREBENYUK, Anastasia (Universite Libre de Bruxelles (BE))

Co-author: CMS COLLABORATION

Presenter: GREBENYUK, Anastasia (Universite Libre de Bruxelles (BE))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 19

Type: **not specified**

Vector Boson production with heavy flavor quarks from CMS

Wednesday, April 18, 2018 2:55 PM (15 minutes)

We present measurements of the total and differential cross-section of vector bosons produced with heavy flavor quarks (HF) and the impact of recent V+HF measurements performed by the CMS collaboration on the constraints of PDFs.

Primary author: BILIN, Bugra (Universite Libre de Bruxelles (BE))

Co-author: CMS COLLABORATION

Presenter: BILIN, Bugra (Universite Libre de Bruxelles (BE))

Session Classification: WG1-WG5 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 20

Type: **not specified**

[Cancelled] Evidence for light-by-light scattering in ultraperipheral PbPb collisions with CMS experiment

Light-by-light (LbyL) scattering ($\gamma\gamma \rightarrow \gamma\gamma$) is a fundamental quantum-mechanical process with tiny cross sections. Studies of LbyL scattering, using the large photon fluxes from ultraperipheral PbPb collisions at $\sqrt{s_N} = 5.02$ TeV at the LHC, will be reported based on the evidence of a signal corresponding to an integrated luminosity of $391 \mu\text{b}^{-1}$. The measurement can be recasted into limits on physics beyond the Standard Model, such as Born-Infeld corrections to quantum electrodynamics or GeV mass axions.

Primary author: CMS COLLABORATION

Presenter: CMS COLLABORATION

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 21

Type: **not specified**

Double parton scattering measurements at CMS

Tuesday, April 17, 2018 3:36 PM (24 minutes)

We present recent results on Double Parton Scattering (DPS) studies using data collected during Run 1 and Run 2 of the LHC with the CMS experiment. Double parton scattering is investigated in several final states including vector bosons and multi-jets. Measurements of observables designed to highlight the DPS contribution are shown and compared to MC predictions from models based on multiple partonic interactions (MPI) phenomenology.

Primary author: VERES, Gabor (Eotvos Lorand University (HU))

Co-author: CMS COLLABORATION

Presenter: VERES, Gabor (Eotvos Lorand University (HU))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 22

Type: **not specified**

Minimum Bias and UE measurements at CMS

Tuesday, April 17, 2018 2:24 PM (24 minutes)

We present results on the measurement of the underlying event at 13 TeV and recent results from Minimum Bias measurements with the CMS experiment.

Primary author: VERES, Gabor (Eotvos Lorand University (HU))

Co-author: CMS COLLABORATION

Presenter: VERES, Gabor (Eotvos Lorand University (HU))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 23

Type: **not specified**

Forward energy flow and jet measurements with CMS

Wednesday, April 18, 2018 9:00 AM (24 minutes)

We present recent results on forward energy flow and forward jet production measurements in CMS, including measurements with proton-proton collisions at 13 TeV, and proton-lead collisions at 5 TeV.

Primary author: GEISER, Achim (Deutsches Elektronen-Synchrotron (DE))

Co-author: CMS COLLABORATION

Presenter: GEISER, Achim (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 24

Type: **not specified**

Exclusive measurements with CMS

Wednesday, April 18, 2018 2:48 PM (24 minutes)

We present recent results on the exclusive production of the Upsilon and rho mesons with the CMS experiment in proton-lead collisions at 5 TeV. And measurements of dipion production in proton-proton collisions at 5, 7, and 13 TeV.

Primary author: RUSPA, Marta (Universita e INFN Torino (IT))

Co-author: CMS COLLABORATION

Presenter: RUSPA, Marta (Universita e INFN Torino (IT))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 25

Type: **not specified**

[Cancelled] Diffractive measurements with CMS and TOTEM

We present recent results on diffraction with the CMS and TOTEM experiments.

Primary author: CMS COLLABORATION

Presenter: CMS COLLABORATION

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 26

Type: **not specified**

QCD Monte-Carlo model tuning studies with CMS data at 13 TeV

Tuesday, April 17, 2018 2:48 PM (24 minutes)

New CMS PYTHIA 8 event tunes are presented. The new tunes are obtained using minimum bias and underlying event observables using Monte Carlo configurations with consistent parton distribution functions and strong coupling constant values in the matrix element and the parton shower. Validation and performance studies are presented by comparing the predictions of the new tune to various soft- and hard-QCD measurements at 7, 8 and 13 TeV with CMS.

Primary author: DOMINGUEZ DAMIANI, Daniela (DESY)

Co-author: CMS COLLABORATION

Presenter: DOMINGUEZ DAMIANI, Daniela (DESY)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 27

Type: **not specified**

[Cancelled] Tuning of Color Reconnection Models with CMS data at 7 and 13 TeV

A study of the latest color-reconnection models in QCD is performed with CMS data. The so called MPI-based, QCD-inspired and gluon-move models are studied within Pythia8, and the tuning parameters for the color reconnection and multiple parton interactions are extracted simultaneously from data. The different tunes are compared with top quark distributions.

Primary author: CMS COLLABORATION

Presenter: CMS COLLABORATION

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 28

Type: **not specified**

Search for heavy resonances in diboson final states at CMS

Thursday, April 19, 2018 10:00 AM (20 minutes)

The large dataset collected so far during Run 2 of the LHC at a centre-of-mass energy of 13 TeV provides a significantly improved sensitivity for discovery of new physics with respect to Run 1. Searches for new resonances in di-boson final states (VV, VH, HH, where $V = W, Z$) with the CMS detector are presented. The analyses are optimised for high sensitivity over a large range in resonance mass. Jet substructure techniques are used to identify hadronic decays of highly-boosted W, Z, and H bosons.

Primary author: SANTOCCHIA, Attilio (Universita e INFN, Perugia (IT))

Co-author: CMS COLLABORATION

Presenter: SANTOCCHIA, Attilio (Universita e INFN, Perugia (IT))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 29

Type: **not specified**

Search for heavy BSM particles coupling to third generation quarks at CMS

Wednesday, April 18, 2018 11:30 AM (20 minutes)

Many models of physics beyond the Standard Model (SM) introduce enhanced couplings to third generation quarks. The predicted signatures at the LHC include single and pair production of vector-like quarks and heavy resonances decaying to third generation quarks. We present results from searches obtained with the full 2016 dataset of proton-proton collisions at 13 TeV. A wide range of final states, from multi-leptonic to entirely hadronic is covered. Jet substructure techniques are employed to identify highly-boosted heavy SM particles in their hadronic decay modes.

Primary author: BERRY, Douglas Ryan (University of Illinois at Chicago (US))

Co-author: CMS COLLABORATION

Presenter: BERRY, Douglas Ryan (University of Illinois at Chicago (US))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 30

Type: **not specified**

Impact of CMS measurements on Proton Structure and QCD parameters

Tuesday, April 17, 2018 3:40 PM (20 minutes)

The sensitivity of CMS measurements to Parton Distribution Functions, strong coupling constant and treatment of heavy flavours in QCD analyses is presented. CMS data collected at various center-of-mass energies and their impact on the PDFs are presented. Measurements of cross sections of jet and top-quark pair production are in particular sensitive to the gluon distribution in the proton and the strong coupling, while the electroweak boson production - inclusive or associated with charm or beauty quarks give insight into the flavour separation of the proton sea and give hints to the treatment of heavy quarks in PDF-related studies.

Primary author: PFLITSCH, Svenja Karen (Deutsches Elektronen-Synchrotron (DE))

Co-author: CMS COLLABORATION

Presenter: PFLITSCH, Svenja Karen (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 31

Type: **not specified**

[Cancelled] Recent ttbar and single top inclusive cross sections results in CMS

Latest results on inclusive top quark pair and single top quark production cross sections are presented using proton-proton collision data collected by CMS at different centre-of-mass energies, including 5 TeV. The single top quark analyses investigate separately the production of top quarks via t-channel exchange, in association with a W boson (tW) or via the s-channel. Final states with at least one charged lepton and one b-jet are explored to measure inclusive production cross sections. The sensitivity of some these measurements to PDFs and extraction of standard model parameters is also described. Moreover, first ttbar cross sections results in proton-lead collisions are discussed.

Primary author: CMS COLLABORATION

Presenter: CMS COLLABORATION

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 32

Type: **not specified**

Top quark pair and single top t-channel differential cross sections in CMS

Tuesday, April 17, 2018 2:40 PM (20 minutes)

Differential measurements of top quark pair and single top quark (t-channel) production cross sections are presented using data collected by CMS at different centre-of-mass energies. The cross sections are measured as a function of various kinematic observables of the top quarks and the jets and leptons of the event final state. The $t\bar{t}$ measurements are extended to the TeV range using jet substructure techniques to exploit the boosted regime. The multiplicity and kinematic distributions of the jets produced in addition to the top quark pair are also investigated. The results are confronted with precise theory calculations.

Primary author: ROH, Youn Jung (Korea University (KR))

Co-author: CMS COLLABORATION

Presenter: ROH, Youn Jung (Korea University (KR))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 33

Type: **not specified**

First measurements of top quark properties with Run-2 data in CMS

Thursday, April 19, 2018 11:20 AM (20 minutes)

Measurements of top quark properties using data collected by the CMS experiment at 13 TeV are presented. The top quark mass is measured in the lepton+jets channel is consistent with the CMS measurements of Run-1. The top quark mass is also studied as a function of the event kinematical properties. For the first time at the LHC, the width of the top quark is directly probed during Run-2, in what constitutes the most precise direct bound of the top quark width performed to date. Finally, searches for flavor-changing neutral currents involving top quarks are also discussed including tZq , and tHq couplings, in top quark pair and single top production.

Primary author: CHEN, Kai-Feng (National Taiwan University (TW))

Co-author: CMS COLLABORATION

Presenter: CHEN, Kai-Feng (National Taiwan University (TW))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 34

Type: **not specified**

Rare top quark production in CMS: $t\bar{t}W$, $t\bar{t}Z$, $t\bar{t}\gamma$, tZ , $t\gamma$, and $t\bar{t}t\bar{t}$ production

Tuesday, April 17, 2018 11:50 AM (20 minutes)

A comprehensive set of measurements of top quark pair and single top quark production in association with EWK bosons (W , Z or γ) is presented. The results are compared to theory predictions and re-interpreted as searches for new physics inducing deviations from the standard model predictions using an effective field theory approach. The status of the search for four top quark production, to which the LHC experiments are starting to be sensitive, and that has important BSM re-interpretations, is also reported.

Primary author: CHOI, Su Yong (Korea University (KR))

Co-author: CMS COLLABORATION

Presenter: CHOI, Su Yong (Korea University (KR))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 35

Type: **not specified**

Search for rare and exotic Higgs boson decays with CMS

Wednesday, April 18, 2018 2:00 PM (20 minutes)

Recent results on the search for the rare and exotic decays of the Higgs boson $H(125)$ from the CMS experiment will be presented in this talk. The large dataset delivered by LHC and collisions at higher center of mass energy of 13 TeV have significantly improved the search sensitivity for these rare and exotic decays with respect to Run-1.

Primary author: KUO, Chia-Ming (National Central University (TW))

Co-author: CMS COLLABORATION

Presenter: KUO, Chia-Ming (National Central University (TW))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 36

Type: **not specified**

Searches for strong production of supersymmetry at CMS

Wednesday, April 18, 2018 4:30 PM (20 minutes)

Results of searches for the production of supersymmetric partners of gluons and quarks are presented. They are based on pp collisions recorded by the CMS experiment at $\sqrt{s} = 13$ TeV. The searches are performed in final states with 0, 1, or more leptons and are either generic, or specifically designed for the production of third-generation squarks. In the most favorable scenarios, mass limits reach up to 2 TeV.

Primary author: RAD, Navid K. (Austrian Academy of Sciences (AT))

Co-author: CMS COLLABORATION

Presenter: RAD, Navid K. (Austrian Academy of Sciences (AT))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 37

Type: **not specified**

[Cancelled] Searches for electroweak production of supersymmetry at CMS

Results of searches for the direct production of sleptons, charginos and neutralinos are presented. Sensitivity to these low cross section modes has been obtained based on the first large dataset of pp collisions recorded by the CMS experiment at $\sqrt{s} = 13$ TeV. The searches are typically performed in final states with two or more leptons. In order to obtain sensitivity to compressed mass spectra as they are expected in higgsino production, they have been extended to include events with low momentum leptons. Decays of neutralinos via a Higgs boson are covered by searches for events with pairs of photons or b jets.

Primary author: CMS COLLABORATION

Presenter: CMS COLLABORATION

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 38

Type: **not specified**

Searches for supersymmetry in final states with photons at CMS

Wednesday, April 18, 2018 2:20 PM (20 minutes)

Final states with isolated photons are expected in models of gauge mediated breaking of supersymmetry, but they can also occur as a result of decays of Higgs bosons produced in the decay chains of supersymmetric particles. Results of searches for strong and electroweak production of supersymmetry in events with one or two isolated photons are presented, based on pp collisions recorded with the CMS experiment at $\sqrt{s} = 13$ TeV. In the case of strong production, the most stringent mass limits obtained by these searches reach 2 TeV.

Primary author: BARTOK, Marton (University of Debrecen (HU))

Co-author: CMS COLLABORATION

Presenter: BARTOK, Marton (University of Debrecen (HU))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 39

Type: **not specified**

The CMS-TOTEM Precision Proton Spectrometer and first physics results

Wednesday, April 18, 2018 4:54 PM (24 minutes)

The CT-PPS (CMS-TOTEM Precision Proton Spectrometer) detector system consists of silicon tracking stations as well as timing detectors to measure both the position and direction of protons and their time-of-flight with high precision. They are located at around 200 m from the interaction point in the very forward region on both sides of the CMS experiment. CT-PPS is built to study Central Exclusive Production (CEP) in proton-proton collisions at LHC, including photon-photon production of W and Z boson pairs, high-mass diphoton and dilepton production, high-pT jet production, as well as searches for anomalous couplings and new resonances.

The CT-PPS detector has taken data at high luminosity while fully integrated to the CMS data acquisition system. The total data collected correspond to around 55-fb^{-1} . In this presentation the CT-PPS operation, commissioning and performance are discussed.

The measurements of dilepton and diphoton production in photon-photon fusion with CT-PPS are presented. For the first time, exclusive dilepton production at high masses have been observed in the CMS detector while one or two outgoing protons are measured in CT-PPS using around 10-fb^{-1} of data accumulated in 2016 during high-luminosity LHC operation. These first results show a good understanding, calibration and alignment of the new CT-PPS detectors. Preliminary results concerning the search for high-mass exclusive diphoton production are presented.

Primary author: ROBUTTI, Enrico (INFN e Universita Genova (IT))

Co-author: CMS COLLABORATION

Presenter: ROBUTTI, Enrico (INFN e Universita Genova (IT))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 40

Type: **not specified**

Measurements of event properties and correlations in multijet events in CMS

Tuesday, April 17, 2018 3:30 PM (25 minutes)

We present results on measurements of characteristics of events with jets, from jet-charge over investigations of shapes to jet mass distributions, and angular correlations in multi-jet events. The measurements are compared to theoretical predictions including those matched to parton shower and hadronization.

Primary author: BERMUDEZ MARTINEZ, Armando (CMS-DESY)

Co-author: CMS COLLABORATION

Presenter: BERMUDEZ MARTINEZ, Armando (CMS-DESY)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 41

Type: **not specified**

Top modelling and tuning in CMS

Wednesday, April 18, 2018 3:25 PM (25 minutes)

State-of-the-art theoretical predictions accurate to next-to-leading order QCD interfaced with Pythia8, Herwig, and Sherpa event generators are tested by comparing the unfolded $t\bar{t}$ differential data collected with the CMS detector at 8 and 13 TeV. These predictions are also compared with the underlying event activity distributions in $t\bar{t}$ events using CMS proton-proton data collected at a center of mass energy of 13 TeV. In addition, studies of jet shapes in $t\bar{t}$ events at 13 TeV are presented. Studies to derive and test the new CMS event tune obtained through jet kinematics in $t\bar{t}$ events and global event variables are also described.

Primary author: SEIDEL, Markus (CERN)

Co-author: CMS COLLABORATION

Presenter: SEIDEL, Markus (CERN)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 42

Type: **not specified**

Exclusive vector meson photoproduction at Run 2 LHC energies: Color dipole predictions

Wednesday, April 18, 2018 3:12 PM (24 minutes)

In this contribution we present a comprehensive analysis of exclusive vector-meson photoproduction in pp , pPb and $PbPb$ collisions at Run 2 LHC energies using the color dipole formalism. The rapidity distributions and total cross sections for the ρ , ϕ , J/Ψ and Υ production are estimated considering the more recent phenomenological models for the dipole-proton scattering amplitude, which are based on the color glass condensate formalism and are able to describe the inclusive and exclusive ep HERA data. Moreover, we also discuss the impact of the modeling of the vector-meson wave functions on the predictions. The current theoretical uncertainty in the color dipole predictions is estimated and a comparison with the experimental results is performed.

Primary author: GONÇALVES, Victor (Universidade Federal de Pelotas)

Presenter: GONÇALVES, Victor (Universidade Federal de Pelotas)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 43

Type: **not specified**

Probing the transverse single spin asymmetry in the inelastic J/Ψ photoproduction at hadronic colliders

Tuesday, April 17, 2018 9:50 AM (20 minutes)

In this contribution we investigate the transverse single spin asymmetry in the inelastic J/Ψ photoproduction in $p^\uparrow p$ and $p^\uparrow A$ collisions at RHIC energies. At leading order this process probes the gluon Sivers function. We predict large values for the cross sections, which indicates that its experimental analysis is, in principle, feasible. The rapidity dependence of the single spin asymmetry is presented. We obtain that the asymmetry is strongly dependent on the model used for the gluon Sivers function and that it can be probed by the analysis of the J/Ψ production at forward rapidities. Our results indicate that a future experimental analysis of this process can be useful to constrain the gluon Sivers function.

Primary author: GONÇALVES, Victor (Universidade Federal de Pelotas)

Presenter: GONÇALVES, Victor (Universidade Federal de Pelotas)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 44

Type: **not specified**

Investigating the dominant regions of the phase space associated with $c\bar{c}$ production relevant for the prompt atmospheric neutrino flux

Wednesday, April 18, 2018 9:30 AM (20 minutes)

A detailed mapping of the dominant kinematical domains contributing to the prompt atmospheric neutrino flux at high neutrino energies is presented by studying their sensitivity to the cuts on several kinematical variables crucial for charm production in cosmic ray scattering in the atmosphere. This includes the maximal center-of-mass energy for proton-proton scattering, the longitudinal momentum fractions of partons in the projectile (cosmic ray) and target (nucleus of the atmosphere), the Feynman x_F variable, and the transverse momentum of charm quark/antiquark. We find that the production of neutrinos with energies larger than $E_\nu > 10^7$ GeV is particularly sensitive to the c.m. energies larger than the ones at the LHC and to the longitudinal momentum fractions in the projectile $10^{-8} < x < 10^{-5}$. We also analyze the characteristic theoretical uncertainties in the charm production cross section coming from its QCD modeling. The precision data on the prompt atmospheric neutrino flux can efficiently constrain the mechanism of heavy quark production and underlying QCD dynamics in kinematical ranges beyond the reach of the current collider measurements.

Primary author: GONÇALVES, Victor (Universidade Federal de Pelotas)

Presenter: GONÇALVES, Victor (Universidade Federal de Pelotas)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 45

Type: **not specified**

Longitudinal-transverse double-spin asymmetry with a $\cos \phi_S$ modulation in SIDIS

Wednesday, April 18, 2018 2:30 PM (20 minutes)

We study the double-spin asymmetry $A_{LT}^{\cos \phi_S}$ in semi-inclusive DIS for charged and neutral pions production by scattering a longitudinal polarized beam off a transversely polarized proton target. Within the collinear framework, in which the transverse momentum of the final state hadron is integrated out, we predict the asymmetries for three pion productions at the kinematics of CLAS12 and future Electron Ion Collider. There are two sources contributed to the corresponding asymmetry, one is from the convolution of the twist-3 distribution function $g_T(x)$ and the unpolarized fragmentation function $D_1(z)$, the other is from the coupling of the transversity distribution function $h_1(x)$ and the collinear twist-3 fragmentation function $\tilde{E}(z)$. Our numerical results show that the $\cos \phi_S$ asymmetry of pion production at CLAS12 is sizable, and the fragmentation function $\tilde{E}(z)$ plays an important role in the large- z region. The asymmetries at EIC are much smaller than those at CLAS12 due to the suppression in the large- Q region.

Primary authors: Dr MAO, Wenjuan (School of Physics and Telecommunication Engineering, Zhoukou Normal University); Ms WANG, Xiaoyu (Southeast University); Prof. LU, Zhun (Southeast University)

Presenter: Dr MAO, Wenjuan (School of Physics and Telecommunication Engineering, Zhoukou Normal University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 46

Type: **not specified**

Search for new physics in CP violation with beauty and charm decays at LHCb

Tuesday, April 17, 2018 9:00 AM (20 minutes)

Precision measurements of CP violating observables in the decays of b and c hadrons are powerful probes to search for physics beyond the Standard Model.

The most recent results on CP violation in the decay, mixing and interference of both b and c hadrons obtained by the LHCb Collaboration with Run I and years 2015-2016 of Run II are reviewed. In particular world best constraints and world first measurements are provided for CKM elements, unitarity angles and charm parameters.

Primary author: DEAN, Cameron (University of Glasgow (GB))

Co-author: MUELLER, Katharina (Universitaet Zuerich (CH))

Presenter: DEAN, Cameron (University of Glasgow (GB))

Session Classification: WG3-WG5 Joint Session

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 47

Type: **not specified**

Particle production at LHCb

Thursday, April 19, 2018 9:24 AM (24 minutes)

The unique acceptance of the LHCb experiment at the LHC offers the ability to make studies of QCD that are complementary to those made at the other LHC experiments.

A selection of recent results will be presented, including production measurements, inelastic cross-section measurements, and studies of correlations in particle production.

Primary author: MUELLER, Katharina (Universitaet Zuerich (CH))

Presenter: STEINKAMP, Olaf (Universitaet Zuerich (CH))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 48

Type: **not specified**

Heavy flavour spectroscopy and exotic states at LHCb

Wednesday, April 18, 2018 5:10 PM (20 minutes)

The LHCb experiment is designed to study heavy hadrons produced in proton-proton collisions at the LHC.

Charmed and charmonium hadrons produced in the pp-collision or in b-hadron decays are studied to identify new states, confirming or disproving those recently claimed, and establishing their quantum numbers. The spectroscopy of heavy baryons is also explored with observations of doubly charmed baryons and new excited states in the beauty sector.

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); ZHANG, Liming (Tsinghua University (CHINA))

Presenter: ZHANG, Liming (Tsinghua University (CHINA))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 49

Type: **not specified**

Heavy-flavour hadron production at LHCb

Wednesday, April 18, 2018 3:10 PM (20 minutes)

The LHCb experiment allows to measure the production and polarisation of charm and beauty hadrons including quarkonia in various collision systems in collider and fixed-target mode. The forward rapidity acceptance in the laboratory frame and the covered Q^2 range test perturbative QCD calculations with their factorisation assumptions and put constraints on parton densities of in unique kinematic regimes. In this talk, recent measurements on inclusive production in pp and pPb collisions in collider mode at different centre-of-mass-energies and fixed-target mode will be presented.

Primary author: ROBBE, Patrick (Université Paris-Saclay (FR))

Co-author: MUELLER, Katharina (Universitaet Zuerich (CH))

Presenter: ROBBE, Patrick (Université Paris-Saclay (FR))

Session Classification: WG1-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 50

Type: **not specified**

B-flavour anomalies in $b \rightarrow sll$ and $b \rightarrow cl\nu$ transitions at LHCb

Tuesday, April 17, 2018 9:20 AM (20 minutes)

The concept of lepton universality, where the muon and tau particles are simply heavier copies of the electron, is a key prediction in the Standard Model (SM). In models beyond the SM, lepton universality can be naturally violated with new physics particles that couple preferentially to the second and third generation leptons. Over the last few years, several hints of lepton universality violation have been seen in both $b \rightarrow c$ and $b \rightarrow s$ semileptonic beauty decays. This presentation will review these anomalies and give an outlook for the near future.

Primary author: STEINKAMP, Olaf (Universitaet Zuerich (CH))

Co-author: MUELLER, Katharina (Universitaet Zuerich (CH))

Presenter: STEINKAMP, Olaf (Universitaet Zuerich (CH))

Session Classification: WG3-WG5 Joint Session

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 51

Type: **not specified**

[Cancelled] Spin dependent structure functions and longitudinal spin asymmetries of the nucleon

The phenomenological study of the spin dependent ($g_1^{p,n}$) structure functions of the nucleon has been carried out using the polarized distribution functions of the quarks $\Delta q(x)$. In light of the improved precision of the world data, the p and n longitudinal spin asymmetries ($A_1^p(x)$ and $A_1^n(x)$) have been calculated. The ratio of the n and p structure functions $R^{np}(x) = \frac{F_2^n(x)}{F_2^p(x)}$ has also been presented. The results have been compared with the recent available experimental observations and other recent approaches.

Primary authors: Dr DAHIYA, Harleen; Dr RANDHAWA, Monika

Presenter: Dr DAHIYA, Harleen

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 52

Type: **not specified**

[Cancelled] Spin-spin correlations of quarks in light-front quark-diquark model

We investigate the spin-spin correlations of longitudinally-polarized quark in a longitudinally-polarized proton $\rho_{\Lambda\lambda}$, transversely-polarized quark in transversely-polarized proton $\rho_{\Lambda_T\lambda_T}^i$, transversely-polarized quark in longitudinally-polarized proton $\rho_{\Lambda\lambda_T}^i$ and longitudinally-polarized quark in transversely-polarized proton $\rho_{\Lambda_T\lambda}^i$ in light-front quark-diquark model. We study the correlations by considering the axial-vector diquark.

Primary authors: Dr DAHIYA, Harleen; Ms KAUR, Satvir

Presenter: Dr DAHIYA, Harleen

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 53

Type: **not specified**

Further studies of isolated photon production with a jet in deep inelastic scattering at HERA

Tuesday, April 17, 2018 12:15 PM (20 minutes)

Isolated photons with high transverse energy have been studied in deep inelastic ep scattering with the ZEUS detector at HERA, using an integrated luminosity of 326 pb^{-1} in the range of exchanged-photon virtuality $10 - 350 \text{ GeV}^2$. Outgoing isolated photons with transverse energy $4 < E_T^\gamma < 15 \text{ GeV}$ and pseudorapidity $-0.7 < \eta^\gamma < 0.9$ were measured with accompanying jets having transverse energy and pseudorapidity $2.5 < E_T^{\text{jet}} < 35 \text{ GeV}$ and $-1.5 < \eta^{\text{jet}} < 1.8$, respectively. Differential cross sections are presented for the following variables: the fraction of the incoming photon energy and momentum that is transferred to the outgoing photon and the leading jet; the fraction of the incoming proton energy transferred to the photon and leading jet; the differences in azimuthal angle and pseudorapidity between the outgoing photon and the leading jet and between the outgoing photon and the scattered electron. Comparisons are made with theoretical predictions: a leading-logarithm Monte Carlo simulation, a next-to-leading-order QCD prediction, and a prediction using the k_T -factorisation approach.

Primary author: WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Co-author: WING, Matthew (University College London)

Presenter: WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 54

Type: **not specified**

Combination and QCD analysis of beauty and charm production cross section measurements in deep inelastic ep scattering at HERA

Wednesday, April 18, 2018 2:00 PM (15 minutes)

Measurements of open beauty and charm production cross sections in deep inelastic ep scattering at HERA from the H1 and ZEUS Collaborations are combined. Reduced cross sections for beauty and charm production are obtained in the kinematic range of photon virtuality $2.5 \leq Q^2 \leq 2000 \text{ GeV}^2$ and Bjorken scaling variable $3 \times 10^{-5} \leq x_{Bj} \leq 5 \times 10^{-2}$. The combination method accounts for the correlations of the statistical and systematic uncertainties among the different data sets. The combined data are compared to perturbative QCD predictions and used together with the combined inclusive deep inelastic scattering cross sections from HERA in a next-to-leading order QCD analysis. The running charm and beauty quark masses are determined as $m_c(m_c) = 1.290^{+0.046}_{-0.041}(\text{exp/fit})^{+0.062}_{-0.014}(\text{model})^{+0.007}_{-0.031}(\text{param}) \text{ GeV}$ and $m_b(m_b) = 4.049^{+0.104}_{-0.109}(\text{exp/fit})^{+0.090}_{-0.032}(\text{model})^{+0.001}_{-0.031}(\text{param}) \text{ GeV}$.

Primary author: GEISER, Achim (Deutsches Elektronen-Synchrotron (DE))

Co-authors: COLLABORATION, H1 and ZEUS (DESY); WING, Matthew (University College London); SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Presenter: GEISER, Achim (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1-WG5 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 55

Type: **not specified**

Generalized distribution amplitudes and gravitational form factors for pion

Thursday, April 19, 2018 10:20 AM (20 minutes)

Generalized parton distributions (GPDs) have been investigated in the deeply virtual Compton scattering (DVCS) to solve the proton spin puzzle. On the other hand, the generalized distribution amplitudes (GDAs) can be studied in the two-photon process $\gamma^*\gamma \rightarrow h\bar{h}$ which is accessible at KEKB. Namely, the GDAs are the s-t crossed quantities of the GPDs. In 2016, the differential cross section of the process $\gamma^*\gamma \rightarrow \pi^0\pi^0$ was measured by the Belle collaboration in the e^+e^- collision [1], so that the pion GDAs can be obtained by analyzing the Belle data. Expressing the GDAs with a few parameters, we determined the GDAs by a χ^2 analysis [2]. The form factors of the quark energy-momentum tensor are obtained from the determined GDAs. Then, we calculated the mass radius as 0.56-0.69 fm and the mechanical radius as 1.45-1.56 fm for the pion by using the form factors. This is the first study on gravitational form factors and radii of hadrons from actual experimental measurements [2]. The Belle II will start taking data in 2018 by the upgraded SuperKEKB. Therefore, much accurate data are expected for the pion in the near future, and other hadron productions will be measured for the GDAs. The GDA studies are valuable for understanding not only the 3D structure but also gravitational properties of hadrons.

[1] M. Masuda et al. (Belle Collaboration), Phys. Rev. D **93**, 032003 (2016).

[2] S. Kumano, Qin-Tao Song and O. V. Teryaev, arXiv:1711.08088, Phys. Rev. D in press.

Primary authors: KUMANO, Shunzo (KEK); SONG, Qin-Tao (Sokendai, KEK); TERYAEV, Oleg (JINR)

Presenter: SONG, Qin-Tao (Sokendai, KEK)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 56

Type: **not specified**

Measurement of photon production cross sections with the ATLAS detector

Tuesday, April 17, 2018 11:30 AM (20 minutes)

The production of prompt isolated photons at hadron colliders provides a stringent test of perturbative QCD and can be used to probe the gluon density function of the proton. The ATLAS collaboration has performed precise measurements of the inclusive production of isolated prompt photons at a center-of-mass energy of 13 TeV, differential in both rapidity and the photon transverse momentum. In addition, the integrated and differential cross sections for isolated photon pair production and -most recently for the first time - the tri-photon production at 8 TeV have been measured. The results are compared with state-of-the-art theory predictions at NLO in QCD and with predictions of several MC generators. In particular the results of the tri-photon production highlight interesting discrepancies to advanced theory calculations.

Primary author: LENZI, Bruno (CERN)

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: LENZI, Bruno (CERN)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 57

Type: **not specified**

Studies of photon production in association with jets at the ATLAS detector

Tuesday, April 17, 2018 12:30 PM (20 minutes)

The production of prompt photons in association with jets in proton–proton collisions provides a testing ground for perturbative QCD (pQCD) with a hard colourless probe less affected by hadronisation effects than jet production. The measurements of the angular correlations between the photon and the jets can be used to probe the dynamics of the hard-scattering process. We present here a cross-section measurement using final states with at least one, two or three hadronic jets in addition to an isolated photon, differential in a wide range of kinematic variables describing the photon+jet production dynamic. Colour-coherence effects were investigated in events with a photon accompanied by two jets. Moreover, we present the latest results on the measurement of isolated photons with jets at 13 TeV as well as on the production of photon-pairs in association with jets. We will also present for the first time measurements on the differential cross sections of isolated-photon plus heavy-flavour jet production at 8 TeV. The results are compared to recent theoretical predictions.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); STOCKTON, Mark (University of Oregon (US))

Presenter: STOCKTON, Mark (University of Oregon (US))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 58

Type: **not specified**

Differential measurements of the Drell-Yan cross-sections

Tuesday, April 17, 2018 12:10 PM (20 minutes)

Measurements of the Drell-Yan production of W and Z/γ bosons at the LHC provide a benchmark of our understanding of perturbative QCD and probe the proton structure in a unique way. The ATLAS collaboration has performed high precision measurements at center-of-mass energies of 7 and 8 TeV. The measurements are performed for W^+ , W^- and Z/γ bosons integrated and as a function of the boson or lepton rapidity and the Z/γ mass. ATLAS also performed a precise triple differential cross-section measurement as a function of M_{ll} , dilepton rapidity and $\cos\theta^*$ defined in the Collins-Soper frame. This measurement provides sensitivity to the PDFs and the Z forward-backward asymmetry, AFB.

Primary author: BLUMENSCHN, Ulla (University of London (GB))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: BLUMENSCHN, Ulla (University of London (GB))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 59

Type: **not specified**

Measurement of the inclusive jet and dijet production with the ATLAS detector

Wednesday, April 18, 2018 10:25 AM (25 minutes)

The production of inclusive jets and di-jets at hadron colliders provides a stringent test of perturbative QCD at the highest energies. The process can also be used to probe the gluon density function of the proton. The ATLAS collaboration has measured the inclusive jet production cross section in 20.3 /fb of data collected at a center-of-mass energy of 8TeV and in 3.2 /fb of data collected at a center-of-mass energy of 13TeV. The measurements have been performed differentially in jet rapidity and transverse momentum. The collaboration also presents a measurement of the di-jet cross section at a center-of-mass energy of 13TeV as a function of the di-jet mass and rapidity-difference. The results have been compared with state-of-the-art theory predictions at NLO in pQCD, interfaced with different parton distribution functions. Special focus is drawn on the correlation models of the associated systematic uncertainties and the interpretation of the chi2-values resulting from theory comparisons. The 13 TeV measurements have also been compared with the more recent NNLO predictions.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); HUBACEK, Zdenek (Czech Technical University (CZ))

Presenter: HUBACEK, Zdenek (Czech Technical University (CZ))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 60

Type: **not specified**

Jet Correlation Measurements at ATLAS and the determination of the strong coupling constant

Tuesday, April 17, 2018 10:00 AM (20 minutes)

The production of multi-jet final states at hadron colliders probes pQCD at several mass scales. The processes can also be used to probe the gluon density function of the proton. The ATLAS collaboration has used multi-jets events, recorded at a center of mass energy of 8 TeV, to measure the transverse energy-energy correlations, its asymmetry and the dijet azimuthal decorrelation. These measurements are particularly sensitive to the strong coupling constant with a reduced model dependency. The resulting value of α_s and the corresponding tests of the renormalization group equation will be presents.

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: WOBISCH, Markus (Louisiana Tech University (US))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 61

Type: **not specified**

Study of hard double parton scattering in four-jet events with the ATLAS detector

Tuesday, April 17, 2018 3:12 PM (24 minutes)

Inclusive four-jet events produced in proton–proton collisions at a center-of-mass energy of 7 TeV have been analyzed for the presence of hard double parton scattering collected with the ATLAS detector. The contribution of hard double parton scattering to the production of four-jet events has been extracted using an artificial neural network. The assumption made was that hard double parton scattering can be represented by a random combination of dijet events. In addition, a sample enriched with double parton scattering events was extracted and several characteristics of these events were studied. The measurements have been compared to different MC generator predictions.

Primary author: VETTERLI, Michel (Simon Fraser University (CA))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: VETTERLI, Michel (Simon Fraser University (CA))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 62

Type: **not specified**

Measurements of the underlying-event properties and hadron production with the ATLAS detector

Tuesday, April 17, 2018 2:00 PM (24 minutes)

A correct modelling of the underlying event in proton-proton collisions is important for the proper simulation of kinematic distributions of high-energy collisions. The ATLAS collaboration extended previous studies at 7 TeV with a leading track or jet or Z boson by a new study at 13 TeV, measuring the number and transverse-momentum sum of charged particles as a function of pseudorapidity and azimuthal angle in dependence of the reconstructed leading track. These measurements are sensitive to the underlying-event as well as the onset of hard emissions. The results are compared to predictions of several MC generators. Further studies shed light on the correlated hadron production, which are an important source of information about the early stages of hadron formation, not yet understood from first principles. In this presentation, we will discuss Bose-Einstein correlations measured with the ATLAS detector along with an analysis of the momentum difference between charged hadrons in high-energy proton-proton collisions. The latter allows the investigation of observables sensitive to the predictions of the quantized string model.

Primary author: CAMPANELLI, Mario (University College London (UK))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: CAMPANELLI, Mario (University College London (UK))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 63

Type: **not specified**

Status and Prospects of measurements of exclusive and diffractive processes with the ATLAS detector

Wednesday, April 18, 2018 4:30 PM (24 minutes)

In the absence of forward proton tagging, exclusive processes can be distinguished in the central part of the ATLAS detector exploiting the large rapidity gap in the central region and the absence of charged particles reconstructed in the inner tracking detector. This strategy has been exploited to study the exclusive production of dilepton pairs in the data taken at centre-of-mass energies of 7 TeV and the exclusive production of W pairs in the 8 TeV data. We also present the latest results on exclusive dimuon production at 13 TeV. Moreover, the ATLAS collaboration has carried out a study of diffractive dijet production. The data distributions are compared with Monte Carlo models and the rapidity gap survival probability has been estimated in the kinematic region with high diffractive contribution. The talk will conclude with prospects of the upcoming physics program with the Atlas Forward Proton detector. Recent results demonstrate its capabilities to distinguish single diffractive events via forward proton tagging.

Primary author: FOSTER, Andrew Geoffrey (University of Birmingham (GB))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: FOSTER, Andrew Geoffrey (University of Birmingham (GB))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 65

Type: **not specified**

Measurement of cross sections and properties of the Higgs boson in decays to bosons using the ATLAS detector

Wednesday, April 18, 2018 9:40 AM (20 minutes)

Measurements of Higgs boson properties and cross sections measured in Higgs boson decays to two photons, two Z bosons, and two W bosons based on pp collision data collected at 13 TeV are presented. In addition, results from the combination of different decay channels are shown.

Primary author: TROVATELLI, Monica (University of Victoria (CA))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: TROVATELLI, Monica (University of Victoria (CA))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 66

Type: **not specified**

Measurements and searches of Higgs boson decays to two fermions

Wednesday, April 18, 2018 9:20 AM (20 minutes)

Measurements and searches of Higgs boson decays to two third- or two second-generation quarks or leptons are presented using 36 fb⁻¹ of pp collision data collected at 13 TeV.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); SCHIAVI, Carlo (INFN Genova)

Presenter: SCHIAVI, Carlo (INFN Genova)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 67

Type: **not specified**

Evidence for Higgs boson production in association with a $t\bar{t}$ pair

Tuesday, April 17, 2018 11:50 AM (20 minutes)

The search for the production of the Higgs Boson with a pair of top-anti-top quarks is both very important and very challenging. This talk presents the analyses using Higgs boson decays to $b\bar{b}$ pairs, to two Z bosons, to other multi-lepton final states, and to a pair of photons, using 36 fb⁻¹ of pp collision data collected at 13 TeV, as well as their combined results.

Primary author: CHOMONT, Arthur (Université Paris-Saclay (FR))

Co-author: REBUZZI, Daniela (Università e INFN, Pavia (IT))

Presenter: CHOMONT, Arthur (Université Paris-Saclay (FR))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 68

Type: **not specified**

Searches for non-Standard Model decays of the Higgs boson

Wednesday, April 18, 2018 10:40 AM (20 minutes)

Theories beyond the Standard Model predict Higgs boson decays at a much enhanced rate compared to the Standard Model, e.g. for decays to $Z+\text{photon}$ or a meson and a photon, or decays that do not exist in the Standard Model, such as decays into two light bosons (a). This talk presents recent results based on 36 fb^{-1} of pp collision data collected at 13 TeV.

Primary author: SUN, Xiaohu (University of Alberta (CA))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: SUN, Xiaohu (University of Alberta (CA))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 69

Type: **not specified**

Searches for high-mass resonances

Thursday, April 19, 2018 9:20 AM (20 minutes)

Several theories beyond the Standard Model predict the existence of new heavy particles decaying into pairs of gauge bosons. In this presentation the latest ATLAS results on searches for resonances decaying into pairs of W or Z bosons or photons, or into a Z boson and a photon, based on 36 fb⁻¹ of pp collision data collected at 13 TeV will be discussed.

Primary author: DE ALMEIDA DIAS, Flavia (University of Copenhagen (DK))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: DE ALMEIDA DIAS, Flavia (University of Copenhagen (DK))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 70

Type: **not specified**

Search for di-Higgs production

Wednesday, April 18, 2018 12:30 PM (20 minutes)

Searches for resonant and non-resonant Higgs boson pair production are performed with LHC data. The searches cover a wide mass range for the resonant case and different decay channels have been explored. No significant deviation from the Standard Model prediction is observed in data. The 95% confidence-level observed and expected limit is set on the cross-section for non-resonant/resonance production.

Primary author: FANG, Yaquan (Chinese Academy of Sciences (CN))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: FANG, Yaquan (Chinese Academy of Sciences (CN))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 71

Type: **not specified**

Muon identification and performance in the ATLAS experiment

Tuesday, April 17, 2018 11:55 AM (20 minutes)

Muon reconstruction and identification play a fundamental role in many analyses of central importance in the LHC run-2 Physics programme. The algorithms and the criteria used in ATLAS for the reconstruction and identification of muons with transverse momentum from a few GeV to the TeV scale will be presented. Their performance is measured in data based on the decays of Z and J/ψ to pair of muons, that provide a large statistics calibration sample. Reconstruction and identification efficiencies are evaluated, as well as momentum scales and resolutions, and the results are used to derive precise MC simulation corrections. Isolation selection criteria and their performances in presence of high pileup will also be presented.

Primary author: RETTIE, Sebastien (University of British Columbia (CA))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: RETTIE, Sebastien (University of British Columbia (CA))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 72

Type: **not specified**

Jet Substructure Measurements Sensitive to Soft QCD effects with the ATLAS Detector

Tuesday, April 17, 2018 2:50 PM (20 minutes)

Calculations of jet substructure observables which are accurate beyond leading-logarithmic accuracy have recently become available. Such observables are significant not only for probing a new regime of QCD at a hadron collider, but also for improving the understanding of jet substructure properties that are used in many studies at the Large Hadron Collider. In this talk, we discuss first measurement of jet substructure quantities at a hadron collider, calculated at next-to-next-to-leading-logarithm accuracy. The soft drop mass is measured in dijet events with the ATLAS detector at 13 TeV, unfolded to particle-level and compared to Monte Carlo simulations. In addition, we present a measurement of the splitting scales in the kt jet-clustering algorithm for final states containing a Z-boson candidate at a centre-of-mass energy of 8 TeV. The data are also corrected for detector effects and are compared to state-of-the-art Monte Carlo predictions.

Primary author: FAROOQUE, Trisha (Michigan State University (US))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: FAROOQUE, Trisha (Michigan State University (US))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 73

Type: **not specified**

Electroweak Precision Measurements with the ATLAS Detector

Wednesday, April 18, 2018 3:00 PM (25 minutes)

With the high integrated luminosities recorded at the LHC and the very good understanding of the ATLAS detector, it is possible to measure electroweak observables to the highest precision. In this talk, we review the measurement of the W boson mass using data, collected at 7 TeV. Special focus is drawn on a discussion of the modeling uncertainties and the physics potential of the latest low-mu runs, recorded at a center of mass energy of 5 and 13 TeV at the end of 2017. The talk will also review the measurement of the triple differential Drell-Yan cross-section at 8 TeV, which can be used to extract the weak mixing angle. We conclude with a presentation of the tau polarization, measured in $Z \rightarrow \tau\tau$ using 20.3/fb of proton proton collision data collected at a center of mass energy of 8 TeV.

Primary author: ZHANG, Zhiqing Philippe (LAL, Orsay (FR))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: ZHANG, Zhiqing Philippe (LAL, Orsay (FR))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 74

Type: **not specified**

Measurement of the diboson production cross section at 8TeV and 13TeV and limits on anomalous triple gauge couplings with the ATLAS detector

Tuesday, April 17, 2018 9:00 AM (25 minutes)

Measurements of the cross sections of the production of pairs of electroweak gauge bosons at the LHC constitute stringent tests of the electroweak sector of the Standard Model and provide a model-independent means to search for new physics at the TeV scale. The ATLAS collaboration has performed detailed measurements of integrated and differential cross sections of the production of heavy di-boson pairs in fully-leptonic and semi-leptonic final states at centre-of-mass energies of 8 and 13 TeV. The results are compared to predictions at NLO (and NNLO) in pQCD and provide constraints on new physics, by setting limits on anomalous triple gauge couplings.

Primary authors: ZHOU, Bing (University of Michigan (US)); REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: ZHOU, Bing (University of Michigan (US))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 75

Type: **not specified**

Vector boson scattering, triple gauge-boson final states and limits on anomalous quartic gauge couplings with the ATLAS detector

Tuesday, April 17, 2018 9:45 AM (20 minutes)

Measurements of the cross sections of the production of three electroweak gauge bosons and of vector-boson scattering processes at the LHC constitute stringent tests of the electroweak sector of the Standard Model and provide a model-independent means to search for new physics at the TeV scale. The ATLAS collaboration searched for the production of three W bosons or of a W boson and a photon together with a Z or W boson at a center of mass energy of 8 TeV. ATLAS has also searched for the electroweak production of a heavy boson and a photon together with two jets. Evidence has been found for the exclusive production of W boson pairs. All results have been used to constrain anomalous quartic gauge couplings and have been compared to the latest theory predictions.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); NITTA, Tatsumi (Waseda University (JP))

Presenter: NITTA, Tatsumi (Waseda University (JP))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 76

Type: **not specified**

Measurements of Vector boson fusion with the ATLAS detector

Tuesday, April 17, 2018 10:05 AM (20 minutes)

The most recent results on the production of single W and Z bosons with two jets at high invariant mass at centre-of-mass energies of 7, 8 and 13 TeV are presented. Integrated and differential cross sections are measured in many different phase space regions with varying degree of sensitivity to the electroweak production in vector boson fusion. The cross section for the electroweak W boson production has been extracted for both integrated and for the first time differential distributions. The results are compared to state-of-the-art theory predictions and are used to constrain anomalous gauge couplings.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); CALFAYAN, Philippe (Indiana University (US))

Presenter: CALFAYAN, Philippe (Indiana University (US))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 77

Type: **not specified**

Measurements of the production of jets in association with a W or Z boson with the ATLAS detector

Wednesday, April 18, 2018 11:30 AM (25 minutes)

The production of jets in association with vector bosons is an important process to study QCD in a multi-scale environment. The ATLAS collaboration has performed measurements of vector boson+jets cross sections, differential in several kinematic variables, in proton-proton collision data taken at center-of-mass energies of 8TeV and 13TeV. The measurements are compared to state-of-the-art theory predictions and can be used to constrain the gluon PDF. In data collected at 8TeV, the collaboration has measured the production of W boson+jets with a large transverse momentum of the leading jet, which enriches the collinear production of the gauge boson and a jet. The measurements are compared to state-of-the-art QCD calculations and Monte Carlo simulations.

Primary authors: KONDRASHOVA, Nataliia (Shanghai Jiao Tong University (CN)); REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: KONDRASHOVA, Nataliia (Shanghai Jiao Tong University (CN))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 78

Type: **not specified**

Identification of boosted hadronically decaying particles with jet substructure in ATLAS Run-2

Tuesday, April 17, 2018 3:10 PM (20 minutes)

In order to exploit the abundance of high momentum heavy particles produced at LHC (top, W/Z and Higgs) and decaying hadronically, the study of jet substructure has become increasingly important throughout a wide array of searches and measurements. The latest ATLAS results in terms of jet substructure measurements and calibrations are presented including studies of performance sensitivity to pileup, with several grooming algorithms and recently developed constituent level pile up mitigation techniques.

Primary author: VEATCH, Jason Robert (Georg August Universitaet Goettingen (DE))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: VEATCH, Jason Robert (Georg August Universitaet Goettingen (DE))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 79

Type: **not specified**

Top quark pair-production cross-section measurements with the ATLAS detector

Tuesday, April 17, 2018 2:00 PM (20 minutes)

Measurements of the inclusive and differential top-quark pair cross sections in proton-proton collisions at both 8 and 13 TeV with the ATLAS detector at the Large Hadron Collider are presented. The inclusive measurements reach high precision and are compared to the best available theoretical calculations. Differential measurements of the kinematic properties of the top quark production are also discussed. These measurements, including results using boosted top quarks, probe our understanding of top quark pair production in the TeV regime. The results, unfolded to particle and parton level, are compared to predictions of Monte Carlo generators implementing NLO matrix elements matched with parton showers and NNLO QCD theory calculations.

Primary author: BARTOS, Pavol (Comenius University (SK))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: BARTOS, Pavol (Comenius University (SK))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: **80**Type: **not specified**

Measurements of $t\bar{t}+X$ using the ATLAS detector

Tuesday, April 17, 2018 12:10 PM (20 minutes)

The large centre-of-mass energy available at the proton-proton collider LHC allows for the copious production of top quark pairs in association with other final state particles at high transverse momenta. The ATLAS experiment has measured several final state observables that are sensitive to additional radiation in top anti-top quark final states. Results on the top production in association with W and Z bosons are presented as well as top pair production with a photon. Analyses probing top pair production with additional QCD radiation are also presented, including top pair production in association with additional heavy flavour jets. These measurements are compared to predictions of modern Monte Carlo generators based on NLO QCD matrix element or LO multi-leg matrix elements.

Primary author: AHMED, Hasib (The University of Edinburgh (GB))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: AHMED, Hasib (The University of Edinburgh (GB))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 81

Type: **not specified**

Top quark pair property measurements using the ATLAS detector at the LHC

Tuesday, April 17, 2018 12:30 PM (20 minutes)

Precise measurements of the properties of the top quark test the Standard Model (SM) and can be used to constrain new physics models. As it may be significantly enhanced by the presence of new physics, the $t\bar{t}$ production charge asymmetry is measured inclusively and differentially using the 8 TeV ATLAS dataset using both the lepton+jets and dilepton channels, including a dedicated measurement for highly boosted top-quarks. The top-quark is predicted in the SM to decay almost exclusively into a W boson and a b-quark. We present a wide range of searches for non-SM top quark decays using the 13 TeV ATLAS datasets, including $t \rightarrow q H$ and $t \rightarrow q Z$. In addition, measurements of the spin correlation and colour flow in $t\bar{t}$ production are presented.

Primary author: KLUTH, Stefan (Max-Planck-Institut für Physik (DE))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: KLUTH, Stefan (Max-Planck-Institut für Physik (DE))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 82

Type: **not specified**

Measurements of the top quark mass using the ATLAS detector at the LHC

Thursday, April 19, 2018 11:40 AM (20 minutes)

The latest measurements of the top quark mass using the ATLAS experiment are presented. A measurement based on a multi-dimensional template fit that can constrain the uncertainties on the energy measurements of jets is presented and combined with measurements using dilepton and all-hadronic events. In addition an analysis of the top quark mass using leptonic kinematic variables is discussed. The measurement uses a novel technique to measure the top quark mass with minimal dependence on hadronic jets. A measurement of the top quark width and the measurements that use precision theoretical QCD calculations for both inclusive $t\bar{t}$ production and $t\bar{t}$ production with an additional jet to extract the top quark mass in the pole-mass scheme are also presented.

Primary author: Dr PINAMONTI, Michele (INFN e Universita Roma Tor Vergata (IT))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: Dr PINAMONTI, Michele (INFN e Universita Roma Tor Vergata (IT))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 83

Type: **not specified**

Single Top quark production cross section using the ATLAS detector at the LHC

Tuesday, April 17, 2018 11:30 AM (20 minutes)

Measurements of single top-quark production in proton-proton collisions are presented based on the 8 TeV and 13 TeV ATLAS datasets. In the leading order process, a W boson is exchanged in the t-channel. The cross-section for the production of single top-quarks and single anti-top-quarks, their ratio, as well as differential cross-section measurements are also reported. These analyses include limits on anomalous contributions to the Wtb vertex and measurement of the top quark polarization. Measurements of the inclusive and differential cross-sections for the production of a single top quark in association with a W boson, the second largest single-top production mode, are also presented. Finally, evidence for s-channel single-top production in the 8 TeV ATLAS dataset is presented. All measurements are compared to state-of-the-art theoretical calculations.

Primary author: ESTRADA PASTOR, Oscar (Univ. of Valencia and CSIC (ES))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: ESTRADA PASTOR, Oscar (Univ. of Valencia and CSIC (ES))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 84

Type: **not specified**

Heavy quark spectroscopy and exotic states in ATLAS

Wednesday, April 18, 2018 5:30 PM (20 minutes)

Heavy quark spectroscopy and exotic states are studied with the ATLAS detector, mainly through final states containing muon pairs from J/ψ decays. The latest results on searches for exotic (tetra- / penta-quark) states in ATLAS are presented.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); TOMS, Konstantin (University of New Mexico (US))

Presenter: TOMS, Konstantin (University of New Mexico (US))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 85

Type: **not specified**

Production and decay of HF in ATLAS

Tuesday, April 17, 2018 9:40 AM (20 minutes)

The angular analysis of the decay of $B_d \rightarrow K^* \mu \mu$ for a number of angular coefficients are measured as a function of the invariant mass squared of the di-muon system for data collected at 8 TeV. Comparison is made to theoretical predictions, including for the observable P_5' , for which there has been recent tension between theory and experiment. In addition the study of kinematical correlations in B hadron pair production is also presented.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); CAMPOVERDE QUEZADA, Angel Fernando (Universitaet Siegen (DE))

Presenter: CAMPOVERDE QUEZADA, Angel Fernando (Universitaet Siegen (DE))

Session Classification: WG3-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: **86**

Type: **not specified**

Conference Opening

Monday, April 16, 2018 9:00 AM (5 minutes)

Primary author: Prof. TAKEDA, Hiroshi (President, Kobe University)

Presenter: Prof. TAKEDA, Hiroshi (President, Kobe University)

Session Classification: Plenary Session

Contribution ID: 87

Type: **not specified**

Practical information on the workshop

Monday, April 16, 2018 9:05 AM (5 minutes)

Primary author: YAMAZAKI, Yuji (Kobe University (JP))

Presenter: YAMAZAKI, Yuji (Kobe University (JP))

Session Classification: Plenary Session

Contribution ID: 88

Type: **not specified**

New results on parton densities of nucleons and nuclei

Monday, April 16, 2018 9:10 AM (40 minutes)

Primary author: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Presenter: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Plenary Session

Contribution ID: **89**

Type: **not specified**

New results on spin and 3D structure measurements

Monday, April 16, 2018 10:00 AM (30 minutes)

Primary authors: GAO, Haiyan (Duke University); GAO, Haiyan (D)

Presenters: GAO, Haiyan (Duke University); GAO, Haiyan (D)

Session Classification: Plenary Session

Contribution ID: 90

Type: **not specified**

Studies on lepton-hadron interactions for precision neutrino physics

Monday, April 16, 2018 11:00 AM (25 minutes)

Primary author: HAYATO, Yoshinari (University of Tokyo)

Presenter: HAYATO, Yoshinari (University of Tokyo)

Session Classification: Plenary Session

Contribution ID: 91

Type: **not specified**

Progress in QCD studies for high-sensitivity EW, Higgs and BSM measurements

Monday, April 16, 2018 11:30 AM (30 minutes)

Primary author: KRETZSCHMAR, Jan (University of Liverpool (GB))

Presenter: KRETZSCHMAR, Jan (University of Liverpool (GB))

Session Classification: Plenary Session

Contribution ID: 92

Type: **not specified**

Collider studies on jet and heavy flavour properties

Monday, April 16, 2018 12:10 PM (30 minutes)

Primary author: Dr CANDELISE, Vieri (Universita e INFN Trieste (IT))

Presenter: Dr CANDELISE, Vieri (Universita e INFN Trieste (IT))

Session Classification: Plenary Session

Contribution ID: 93

Type: **not specified**

Multi-leg hadronic final state calculation and simulation

Monday, April 16, 2018 2:00 PM (30 minutes)

Primary author: FREDERIX, Rikkert (TUM)

Presenter: FREDERIX, Rikkert (TUM)

Session Classification: Plenary Session

Contribution ID: 94

Type: **not specified**

Altarelli Prize celemony

Monday, April 16, 2018 2:40 PM (10 minutes)

Primary author: GALLO, Elisabetta (DESY)

Presenter: GALLO, Elisabetta (DESY)

Session Classification: Plenary Session

Contribution ID: 95

Type: **not specified**

Altarelli Prize talk 1

Monday, April 16, 2018 2:50 PM (15 minutes)

Primary author: Dr GAO, Jun (Jiao Tong University, Shanghai)

Presenter: Dr GAO, Jun (Jiao Tong University, Shanghai)

Session Classification: Plenary Session

Contribution ID: 96

Type: **not specified**

Altarelli Prize talk 2

Monday, April 16, 2018 3:10 PM (15 minutes)

Primary author: HEN, Or (Massachusetts Institute of Technology)

Presenter: HEN, Or (Massachusetts Institute of Technology)

Session Classification: Plenary Session

Contribution ID: 97

Type: **not specified**

Recent results on forward physics

Monday, April 16, 2018 3:30 PM (30 minutes)

Primary author: NYSTRAND, Joakim (University of Bergen (NO))

Presenter: NYSTRAND, Joakim (University of Bergen (NO))

Session Classification: Plenary Session

Contribution ID: 98

Type: **not specified**

Experimental studies on fragmentation and exotic hadrons

Monday, April 16, 2018 4:30 PM (20 minutes)

Primary author: MIYABAYASHI, Kenkichi (Nara Women's University)

Presenter: MIYABAYASHI, Kenkichi (Nara Women's University)

Session Classification: Plenary Session

Contribution ID: 99

Type: **not specified**

Hadron shape fluctuation and its relation to DIS

Monday, April 16, 2018 4:55 PM (20 minutes)

Primary author: Dr MÄNTYSAARI, Heikki (University of Jyväskylä)

Presenter: Dr MÄNTYSAARI, Heikki (University of Jyväskylä)

Session Classification: Plenary Session

Contribution ID: **100**

Type: **not specified**

Lattice QCD and Hadron Structure

Monday, April 16, 2018 5:20 PM (20 minutes)

Primary author: AOKI, Yasumichi (N)

Presenter: AOKI, Yasumichi (N)

Session Classification: Plenary Session

Contribution ID: **101**

Type: **not specified**

WG1 summary

Friday, April 20, 2018 9:00 AM (20 minutes)

Primary authors: CAMPANELLI, Mario (University College London (UK)); GUNNELLINI, Paolo (Deutsches Elektronen-Synchrotron (DE)); BERTONE, Valerio (NIKHEF)

Presenter: BERTONE, Valerio (NIKHEF)

Session Classification: Plenary Session

Contribution ID: **102**

Type: **not specified**

WG2 summary

Friday, April 20, 2018 9:30 AM (20 minutes)

Primary author: MORAES, Arthur (CBPF - Brazilian Center for Physics Research (BR))

Presenter: MORAES, Arthur (CBPF - Brazilian Center for Physics Research (BR))

Session Classification: Plenary Session

Contribution ID: **103**

Type: **not specified**

WG3 summary

Friday, April 20, 2018 10:00 AM (20 minutes)

Primary authors: CARPENTER, Linda (UC Irvine); CARPENTER, Linda (Ohio State University); SWIATLOWSKI, Maximilian J (University of Chicago (US))

Presenters: CARPENTER, Linda (UC Irvine); CARPENTER, Linda (Ohio State University); SWIATLOWSKI, Maximilian J (University of Chicago (US))

Session Classification: Plenary Session

Contribution ID: **104**

Type: **not specified**

WG4 summary

Friday, April 20, 2018 10:30 AM (20 minutes)

Primary authors: RE, Emanuele (CERN); VOUTILAINEN, Mikko (Helsinki Institute of Physics (FI))

Presenters: RE, Emanuele (CERN); VOUTILAINEN, Mikko (Helsinki Institute of Physics (FI))

Session Classification: Plenary Session

Contribution ID: **105**

Type: **not specified**

WG5 summary

Friday, April 20, 2018 11:30 AM (20 minutes)

Primary author: OWEN, Mark Andrew (University of Glasgow (GB))

Presenter: OWEN, Mark Andrew (University of Glasgow (GB))

Session Classification: Plenary Session

Contribution ID: **106**

Type: **not specified**

WG6 summary

Friday, April 20, 2018 12:00 PM (20 minutes)

Primary author: HATTA, Yoshitaka (Japan/Yukawa Institute)

Presenter: HATTA, Yoshitaka (Japan/Yukawa Institute)

Session Classification: Plenary Session

Contribution ID: **107**

Type: **not specified**

WG7 summary

Friday, April 20, 2018 12:30 PM (20 minutes)

Primary authors: XIAO, Bowen (Central China Normal University); SCHWANENBERGER, Christian (Deutsches Elektronen-Synchrotron (DE)); FURLETOVA, Yulia (Jefferson Lab)

Presenters: SCHWANENBERGER, Christian (Deutsches Elektronen-Synchrotron (DE)); FURLETOVA, Yulia (Jefferson Lab)

Session Classification: Plenary Session

Contribution ID: **108**

Type: **not specified**

High-energy DIS studies with nucleons

Friday, April 20, 2018 2:00 PM (25 minutes)

Primary author: KLEIN, Uta (University of Liverpool (GB))

Presenter: KLEIN, Uta (University of Liverpool (GB))

Session Classification: Plenary Session

Contribution ID: **109**

Type: **not specified**

High-energy DIS studies with nuclei

Friday, April 20, 2018 2:30 PM (25 minutes)

Primary author: ULLRICH, Thomas (Yale University (US))

Presenter: ULLRICH, Thomas (Yale University (US))

Session Classification: Plenary Session

Contribution ID: 110

Type: **not specified**

Theoretical perspective for the future experiments on parton densities

Friday, April 20, 2018 3:00 PM (25 minutes)

Primary author: KUMANO, Shunzo (KEK)

Presenter: KUMANO, Shunzo (KEK)

Session Classification: Plenary Session

Contribution ID: 111

Type: **not specified**

An ep/eA Experiment at the LHC

Friday, April 20, 2018 3:30 PM (15 minutes)

Primary author: KLEIN, Max

Presenter: KLEIN, Max

Session Classification: Plenary Session

Contribution ID: 112

Type: **not specified**

Status of the EIC project

Friday, April 20, 2018 3:50 PM (15 minutes)

Primary author: Prof. SURROW, Bernd (Temple University)

Presenter: Prof. SURROW, Bernd (Temple University)

Session Classification: Plenary Session

Contribution ID: 113

Type: **not specified**

Concluding talk

Friday, April 20, 2018 4:30 PM (40 minutes)

Primary author: TOKUSHUKU, Katsuo (High Energy Accelerator Research Organization (JP))

Presenter: TOKUSHUKU, Katsuo (High Energy Accelerator Research Organization (JP))

Session Classification: Plenary Session

Contribution ID: **114**

Type: **not specified**

Report from the IAC

Friday, April 20, 2018 5:15 PM (10 minutes)

Primary author: LEVY, Aharon (Tel Aviv University (IL))

Presenter: LEVY, Aharon (Tel Aviv University (IL))

Session Classification: Plenary Session

Contribution ID: 115

Type: **not specified**

Report from LOC

Friday, April 20, 2018 5:25 PM (10 minutes)

Primary author: YAMAZAKI, Yuji (Kobe University (JP))

Presenter: YAMAZAKI, Yuji (Kobe University (JP))

Session Classification: Plenary Session

Contribution ID: 116

Type: **not specified**

Gluon shadowing and LHC heavy-flavour data

Wednesday, April 18, 2018 11:30 AM (20 minutes)

We use for the first time experimental data for the inclusive heavy quark (D_0 , J/Ψ , $B \rightarrow J/\Psi$ and $Y(1S)$ mesons) production in proton-lead collisions at the LHC in order to improve our knowledge of the gluon momentum distribution inside heavy nuclei. We observe that the nuclear effects encoded in both most recent global fits of nuclear parton densities at next-to-leading order (nCTEQ15 and EPPS16) provide a good overall description of the LHC data. We interpret this as a hint that these effects are the dominant ones. In turn, we perform a Bayesian reweighting analysis for each particle data sample which show that each of the existing heavy quark(onium) data clearly point (with a statistical significance ranging from 7 to 11 sigma) to a shadowed gluon distribution at small x in the lead. Our analysis also corroborates the existence of gluon antishadowing. Overall, the inclusion of such heavy-flavour data in a global fit would significantly reduce the uncertainty on the gluon density down to $x \simeq 5 * 10^{-6}$ while keeping an agreement with the other data of the global fits. Our study accounts for the factorisation scale uncertainties which become the largest for the charm(onium) sector.

Primary authors: KUSINA, Aleksander (Institute of Nuclear Physics PAN); LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS); SCHIENBEIN, Ingo (Universite Joseph Fourier); SHAO, Huasheng (Laboratoire de Physique Théorique des Hautes Énergies (LPTHE))

Presenter: KUSINA, Aleksander (Institute of Nuclear Physics PAN)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 117

Type: **not specified**

Direct Measurement of V_{td} and V_{ts} through electron proton collisions

Thursday, April 19, 2018 12:00 PM (20 minutes)

We perform a study on the direct measurement of V_{td} and V_{ts} CKM matrix elements, at the electron proton colliders, through W boson and bottom quark associated production channel as well as W boson and jet associated production channel. The W and bottom(jet) final states can be produced by s -channel single top decay or t -channel top exchange. We find even at the current LHC based ep collider, the channels we are using, already result in very good limits, thus good direct measurement potentials to the V_{td} and V_{ts} CKM matrix elements.

Primary author: Mr SUN, Hao (Dalian University of Technology)

Presenter: Mr SUN, Hao (Dalian University of Technology)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 118

Type: **not specified**

The STAR Cold QCD Physics Program after 2020

Tuesday, April 17, 2018 2:00 PM (30 minutes)

The STAR experiment is planning to upgrade the forward rapidity region ($2.5 < \eta < 4.5$) to enable novel measurements in p+p, p+A and A+A collisions. The upgrade is motivated by exploration of cold QCD physics in the very high and low regions of Bjorken x . The current design envisions a Calorimeter System (FCS) that integrates parts of the refurbished PHENIX sampling ECal and a hadronic calorimeter (sandwich iron scintillator plates). In addition to the FCS, a Forward Tracking System (FTS) is also proposed to discriminate the hadron charge sign in p+p and p+A collisions at high momenta $p < 80$ GeV/c. The design combines three Silicon mini-strip disks and four Small-Strip Thin Gap Chamber (sTGC) wheels similar to the ATLAS muon detector upgrade. In addition, STAR's excellent capabilities at midrapidity are upgraded to moderate forward kinematics ($|\eta| < 1.7$) for the Beam Energy Scan (phase II) and beyond. The full set of upgrades will enable key physics opportunities in three broad areas of interest: the dynamics of low and high x partons in cold nuclear matter (CNM); a modification of fragmentation and hadronization of partons through interactions within CNM; experiments to study the 2+1d momentum and spatial structure of protons and nuclei. These measurements will provide critical new insights into the QCD structure of nucleons and nuclei in the near term, as well as the high precision data that will be essential to enable rigorous universality tests when combined with future results from the EIC.

Primary author: ASCHENAUER, elke-caroline (BNL)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: ASCHENAUER, elke-caroline (BNL)

Session Classification: WG6-WG7 Joint Session

Track Classification: WG7: Future of DIS

Contribution ID: 119

Type: **not specified**

Inclusive searches for squarks and gluinos with the ATLAS detector

Wednesday, April 18, 2018 4:50 PM (20 minutes)

Despite the absence of experimental evidence, weak scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarises recent ATLAS results on inclusive searches for supersymmetric squarks and gluinos, including third generation squarks produced in the decay of gluinos. The searches involve final states containing jets, missing transverse momentum with and without light leptons, taus or photons, and were performed with pp collisions at a centre-of-mass energy of 13 TeV.

Primary author: LEBLANC, Matt (University of Arizona (US))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: LEBLANC, Matt (University of Arizona (US))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 120

Type: **not specified**

Searches for direct pair production of third generation squarks with the ATLAS detector

Wednesday, April 18, 2018 5:10 PM (20 minutes)

Naturalness arguments for weak-scale supersymmetry favour supersymmetric partners of the third generation quarks with masses not too far from those of their Standard Model counterparts. Top or bottom squarks with masses less than or around one TeV can also give rise to direct pair production rates at the LHC that can be observed in the data sample recorded by the ATLAS detector. The talk presents recent ATLAS results from searches for direct stop and sbottom pair production, using the data collected during the LHC Run 2.

Primary author: MITREVSKI, Jovan (Ludwig Maximilians Universitat (DE))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: MITREVSKI, Jovan (Ludwig Maximilians Universitat (DE))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 121

Type: **not specified**

Searches for electroweak production of supersymmetric gauginos and sleptons with the ATLAS detector

Wednesday, April 18, 2018 3:20 PM (20 minutes)

Many supersymmetry models feature gauginos and also sleptons with masses less than a few hundred GeV. These can give rise to direct pair production rates at the LHC that can be observed in the data sample recorded by the ATLAS detector. The talk presents results from searches for gaugino and slepton pair production in final states with leptons, and were performed with pp collisions at a centre-of-mass energy of 13 TeV.

Primary authors: LORENZ, Jeanette Miriam (Ludwig Maximilians Universitat (DE)); REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: LORENZ, Jeanette Miriam (Ludwig Maximilians Universitat (DE))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 122

Type: **not specified**

Searches for supersymmetry in resonance production, R-parity violating signatures and events with long-lived particles with the ATLAS detector

Wednesday, April 18, 2018 3:00 PM (20 minutes)

R-parity violation introduces many viable signatures to the search for supersymmetry at the LHC. Strongly interacting resonances and lightest supersymmetric particles may decay into many leptons or jets with or without missing transverse momentum. Several supersymmetric models also predict massive long-lived supersymmetric particles. Such particles may be detected through abnormal specific energy loss, appearing or disappearing tracks, displaced vertices, long time-of-flight or late calorimetric energy deposits. The talk presents recent results from searches of supersymmetry in resonance production, R-parity violating signatures and events with long-lived particles with the ATLAS detector.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); SANDOVAL USME, Carlos (Universidad Antonio Narino (CO))

Presenter: SANDOVAL USME, Carlos (Universidad Antonio Narino (CO))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 123

Type: **not specified**

Reconstruction techniques in supersymmetry searches in the ATLAS experiment

Wednesday, April 18, 2018 2:40 PM (20 minutes)

Many supersymmetric scenarios feature final states with non-standard final state objects. The production of massive sparticles can lead to the production of boosted top quarks or vector bosons, high-pt b-jets. At the same time, transitions between nearly mass-degenerate sparticles can challenge the standard reconstruction because of the presence of very soft leptons or jets. The talk will review the application of innovative reconstruction techniques to supersymmetry searches in ATLAS.

Primary author: Dr GRAMSTAD, Eirik (University of Oslo (NO))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: Dr GRAMSTAD, Eirik (University of Oslo (NO))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 124

Type: **not specified**

Exclusive Photoproduction of $2\pi^+2\pi^-$ Final State at HERA

Tuesday, April 17, 2018 9:00 AM (24 minutes)

Exclusive production of four charged pions at the ep collider HERA is studied at small photon virtualities $Q^2 < 2 \text{ GeV}^2$. The data were taken with the H1 detector in the years 2006 and 2007 at a centre-of-mass energy of $\sqrt{s} = 319 \text{ GeV}$ and correspond to an integrated luminosity of 7.6 pb^{-1} . The cross section of the reaction $\gamma p \rightarrow 2(\pi^+\pi^-)Y$ is determined in the phase space of $45W_{gp}100 \text{ GeV}$, $|t|1 \text{ GeV}^2$ and $M_Y 1.6 \text{ GeV}$. The 4π mass spectra indicate that the reaction proceeds predominantly via production and decay of $\rho'(1450)$ and $\rho''(1700)$ resonances. Parameters of these resonances as well as production cross sections times branching ratio into four charged pions are estimated from the mass fit, which includes contributions from non-resonant 4π channel and interference terms.

Primary authors: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE)); LEVONIAN, Sergey (Deutsches Elektronen-Synchrotron (DE)); COLLABORATION, H1 (DESY)

Presenter: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 125

Type: **not specified**

Quarkonium production in pp and p-Pb collisions with ALICE at the LHC

Wednesday, April 18, 2018 11:30 AM (20 minutes)

Quarkonium production at LHC energies proceeds mainly via gluon fusion on relatively short timescales. The measurement of quarkonium cross sections and kinematical distributions in pp collisions allows one to test available production models. The measurement of such observables in p-Pb collisions provides access to the nuclear modifications of parton distribution functions and to other so-called cold nuclear matter effects. For both colliding systems, the study of quarkonium production as a function of the charged-particle multiplicity provides information on the interplay between the hard and soft sector of QCD.

The inclusive production of charmonium and bottomonium is measured by ALICE down to zero transverse momentum in the forward rapidity region ($2.5 < y < 4.0$). Charmonium production is also measured down to zero transverse momentum at mid-rapidity ($|y| < 0.9$), where the non-prompt contribution from beauty-hadron decays can be separated.

The ALICE results on quarkonia in pp and p-Pb collisions will be presented for a wide range of centre-of-mass energies, and compared to theoretical models.

Primary authors: GAGLIARDI, Martino (Universita e INFN Torino (IT)); FOR THE ALICE COLLABORATION

Presenter: GAGLIARDI, Martino (Universita e INFN Torino (IT))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 126

Type: **not specified**

Recent STAR Measurements to Constrain the Polarized Gluon Distribution Function of the Proton

Wednesday, April 18, 2018 11:30 AM (30 minutes)

The STAR experiment has been studying the spin structure of the proton, using the unique high-energy polarized proton collider, the Relativistic Heavy Ion Collider (RHIC). The kinematic coverage at STAR allows accessing gluons because quark-gluon and gluon-gluon scatterings dominate particle production at low and medium transverse momentum. The polarized gluon distribution function can be constrained by measuring the longitudinal double-spin asymmetry (A_{LL}) of jet production and neutral pions. Global QCD analyses of polarized parton distribution functions, which include the 2009 A_{LL} STAR results for inclusive jet production at $\sqrt{s} = 200 \text{ GeV}$, provide evidence of a non-zero gluon polarization in the measured range of partonic momentum fraction $x > 0.05$. We present the status of the latest measurements of A_{LL} at STAR, for inclusive jet and dijet production at $\sqrt{s} = 510 \text{ GeV}$ and 200 GeV collected in 2013 and 2015 respectively, both at mid-rapidity ($|\eta| < 0.9$). The large data sample taken during these years will improve the precision of our knowledge about the proton spin structure while the increased center of mass energy allows probing the polarized gluon distribution function at smaller partonic momentum fraction. Furthermore, we present measurements of A_{LL} for neutral pions at forward rapidity ($2.65 < \eta < 3.9$) collected during 2012 and 2013 that also allow reaching lower partonic momentum fraction. We compare these measurements with the latest global analyses.

Primary author: QUINTERO, Amilkar (Temple University)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: QUINTERO, Amilkar (Temple University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 127

Type: **not specified**

Inclusive Jet Measurements in Longitudinally Polarized Proton-Proton Collisions at STAR

Wednesday, April 18, 2018 12:00 PM (20 minutes)

Jet production in high energy proton-proton (pp) collisions is dominated by hard QCD scatterings such as gluon-gluon (gg) and quark-gluon (qg) scatterings, and therefore an effective tool to probe the internal distribution of gluons in the proton. The STAR Collaboration at Relativistic Heavy Ion Collider (RHIC) is using longitudinally polarized pp collisions at center of mass energies, $\sqrt{s} = 200$ and 510 GeV, to study the production cross-section and double helicity spin asymmetry, A_{LL} , of inclusive jet and di-jet productions. The inclusive jet and di-jet cross-section measurements by STAR at $\sqrt{s} = 200$ GeV showed the jet cross-section is consistent with next-to-leading-order perturbative QCD calculations after underlying event and hadronic corrections. The STAR 2009 inclusive jet A_{LL} measurement in mid-pseudo-rapidity range, $|\eta| < 1.0$, at $\sqrt{s} = 200$ GeV showed the first experimental evidence of a non-zero gluon polarization for Bjorken- x , $x > 0.05$. The inclusive jet A_{LL} measurements at $\sqrt{s} = 510$ GeV allow to explore the gluon polarization at smaller $x \sim 0.02$. In this talk, the inclusive jet A_{LL} and cross-section measurements at $\sqrt{s} = 510$ GeV, the techniques used in the jet analysis including consideration of underlying event effects, and future perspectives related to jet measurements at STAR will be presented.

Primary author: CHANG, Zilong (BNL)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: CHANG, Zilong (BNL)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 128

Type: **not specified**

Recent STAR Results on the Measurement of the Unpolarized and Polarized Light Quark Flavor Structure of W-Boson Production at RHIC at BNL

Wednesday, April 18, 2018 9:25 AM (25 minutes)

The STAR experiment at the Relativistic Heavy-Ion Collider at Brookhaven National Laboratory is carrying out a spin physics program in high-energy polarized proton collisions to gain a deeper insight into the spin structure and dynamics of the proton.

The collision of polarized protons at $\sqrt{s} = 510$ GeV opens a new era of spin-flavor structure measurements from W^+/W^- boson production through a measurement of the longitudinal single-spin asymmetry, A_L . In addition, the measurement of the cross-section ratio of W^+/W^- boson production provides an independent way to probe the ratio of unpolarized \bar{d} and \bar{u} quark distribution functions. $W^{-(+)}$ bosons are produced in $\bar{u} + d$ ($\bar{d} + u$) collisions and can be detected through their leptonic decays, $e^- + \bar{\nu}_e$ ($e^+ + \nu_e$), where only the respective charged lepton is measured. The discrimination of $\bar{u} + d$ ($\bar{d} + u$) quark combinations requires distinguishing between high p_T $e^{-(+)}$ through their opposite charge sign, which in turn requires precise tracking information.

The main STAR detector sub-systems used in this measurement are the Time Projection Chamber (TPC) and the Barrel and Endcap Electromagnetic Calorimeters (BEMC, EEMC). The TPC provides tracking inside an axial magnetic field of 0.5 T for a pseudorapidity range of $|\eta| < 1.3$. The BEMC and EEMC provide full azimuthal coverage for $|\eta| < 1$ and $1.09 < \eta < 2$, respectively. This detector acceptance range measuring scattered $e^{-(+)}$ from $W^{-(+)}$ boson decays in polarized proton collisions at $\sqrt{s} = 510$ GeV allows to probe a kinematic range of roughly $0.05 < x < 0.3$.

The status and recent STAR results will be presented on the measurement of W^+/W^- longitudinal single-spin asymmetry and the cross-section ratio based on data samples taken in 2011, 2012 and 2013. These results are expected to provide important constraints through a global analysis on the understanding of \bar{d} and \bar{u} quark distribution functions.

Primary author: SURROW, Bernd (Temple University)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: SURROW, Bernd (Temple University)

Session Classification: WG1-WG6 Joint Session

Track Classification: WG6: Spin and 3D structure

Contribution ID: 129

Type: **not specified**

Recent Transverse Spin Measurements in pp Collisions with STAR

Tuesday, April 17, 2018 9:00 AM (30 minutes)

The STAR Collaboration at RHIC is exploring the partonic origin of the proton spin with a broad range of measurements in polarized pp collisions. STAR measurements of the transverse single-spin asymmetry, A_N , for W boson production provide the first experimental investigation of the non-universality of the Sivers function. Precise follow-up measurements of A_N for direct photon production, Drell-Yan di-electron production, and W boson production are underway that will both provide a definitive test of the non-universality and constrain evolution of transverse-momentum-dependent distributions (TMDs) over a very wide Q^2 range. STAR measurements of interference fragmentation functions and the transverse single-spin dependence of the azimuthal modulation of pions in jets provide the first observations of transversity in pp collisions. The results enable tests of universality and factorization-breaking effects for TMDs in hadronic interactions. Additional transverse modulations provide limits on gluon linear polarization and the twist-3 analog of the gluon Sivers distribution. The current status of these analyses and the prospects to extend them in the near future will be discussed.

Primary authors: GAGLIARDI, Carl (Texas A&M University); GAGLIARDI, Carl (Texas A&M University)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenters: GAGLIARDI, Carl (Texas A&M University); GAGLIARDI, Carl (Texas A&M University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 130

Type: **not specified**

Transverse Spin Transfer of Lambda and Anti-Lambda in Polarized Proton-Proton Collisions at 200 GeV at STAR

Wednesday, April 18, 2018 2:50 PM (20 minutes)

The transverse spin transfer from polarized proton to Λ and $\bar{\Lambda}$ hyperons is expected to be sensitive to the transversity distribution of the nucleon, and to the transversely polarized fragmentation function. We report the first measurement of the transverse spin transfer of Λ and $\bar{\Lambda}$ along the polarization direction of the fragmenting quark, D_{TT} , in transversely polarized proton+proton collisions at $\sqrt{s} = 200\text{GeV}$ with the STAR experiment at RHIC. The data correspond to an integrated luminosity of 18.4 pb^{-1} , which cover a kinematic range of pseudo-rapidity $|\eta| < 1.2$ and hyperon transverse momentum p_T up to 8 GeV/c. The prospect of hyperon polarization measurements in the forward pseudo-rapidity region ($2.5 < \eta < 4$) in proton+proton collisions in 2021+ will also be discussed, which is based on the STAR forward detector upgrade plan including a forward tracking system and a forward calorimeter system.

Primary author: XU, Qinghua (Shandong University)

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: XU, Qinghua (Shandong University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 131

Type: **not specified**

ρ^0 photoproduction and the Q^2 evolution of the shape of gold nuclei

Wednesday, April 18, 2018 2:00 PM (24 minutes)

Coherent photoproduction of vector mesons is sensitive to the shape of the target nucleus, as probed at $Q^2 \sim (M_V/2)^2$. Previously STAR presented a high-statistics measurement of $d\sigma/dt$ for ρ^0 photoproduction in ultra-peripheral Au+Au collisions, and made a two-dimensional Fourier-Bessel (Hanckel) transformation to give the distribution of targets in the nucleus. Here, we study the Q^2 evolution of $d\sigma/dt$ and the target distribution by dividing the ρ^0 signal into three different mass bins, to see how $d\sigma/dt$ evolves with Q^2 , and see the effect on the target distribution. With increasing Q^2 , we expect to see a decrease in multiple interactions, which should emphasize the interior of the nucleus compared to measurements at lower Q^2 .

Primary author: KLEIN, Spencer (University of California Berkeley (US))

Co-author: BIELCIKOVA, Jana (Acad. of Sciences of the Czech Rep. (CZ))

Presenter: KLEIN, Spencer (University of California Berkeley (US))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 132

Type: **not specified**

Open heavy flavour production in pp and p-Pb collisions with ALICE

Wednesday, April 18, 2018 4:30 PM (20 minutes)

Measurements of heavy-flavour production are a powerful tool to study the properties of the strongly-interacting partonic medium created in ultra-relativistic heavy-ion collisions. The measurements in pp collisions serve as a precision test of perturbative QCD apart from providing the crucial reference for Pb-Pb collisions. Measurements in p-Pb collisions are used to investigate cold nuclear matter effects such as the modification of the parton densities in nuclei with respect to nucleons, k_T broadening and energy loss in cold nuclear matter, or a potential existence of collective phenomena. ALICE is well suited to measure heavy-flavour (charm and beauty) production, not only via the full reconstruction of hadronic decays of D-mesons and charm baryons at mid rapidity but also via the measurement of electrons (muons) from semileptonic heavy-flavour hadron decays at mid (forward/backward) rapidity. The aforementioned measurements are performed over a wide transverse-momentum range thanks to the high precision tracking, good vertexing capabilities and excellent particle identification provided by the ALICE detectors. In this contribution, recent results on open heavy-flavour production in pp and p-Pb collision systems will be presented for a wide range of p_T and pseudorapidity and for different center-of-mass energies.

Primary author: Prof. KWEON, Min Jung (Inha University (KR))

Presenter: Prof. KWEON, Min Jung (Inha University (KR))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 133

Type: **not specified**

Multi particle production in proton-nucleus collisions

Wednesday, April 18, 2018 9:48 AM (24 minutes)

Using the formalism of the light-cone wave function in perturbative QCD together with the hybrid factorization, we compute the cross-section for three particle production at forward rapidities in proton-nucleus collisions. In this picture, the three produced partons —a quark accompanied by a gluon pair, or two quarks plus one antiquark —are all generated via two successive splittings of a quark from the incoming proton, that was originally collinear with the latter. The three partons are put on-shell by their scattering off the nuclear target, described as Lorentz-contracted “shockwave”. We explicitly compute the three-parton Fock space components of the light-cone wave function of the incoming quark and also the “production” state, which describes the scattering between this dressed quark state and the shockwave for the purposes of computing particle production. This “production” state is also an ingredient for other interesting calculations, like the next-to-leading order correction to the cross-section for the production of a pair of jets.

Primary authors: Prof. IANCU, Edmond (Université Paris-Saclay (FR)); Dr MULIAN, Yair

Presenter: Dr MULIAN, Yair

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 135

Type: **not specified**

Di-jets the Path to the (un)polarized Partonic Photon Structure at an EIC

Wednesday, April 18, 2018 9:30 AM (18 minutes)

In electron-proton collisions, the incoming electron is coupled directly to a parton of the proton with the exchange of a virtual photon, which has properties close to a real photon when the transfer momentum is small. In QCD, the exchanged physical photon can be approximated as a superposition of the bare photon state (direct process) and the hadronic photon state (resolved process). We discuss how the measurement of di-jets can be utilized to separate these two types of processes. Measuring di-jets in quasi-real photoproduction events, one can effectively access the underlying parton structure of the exchanged photons.

The unpolarized photon PDFs can be extracted with high precision from the di-jet cross section. It will be shown that the polarized PDFs for photons can for the first time be extracted by measuring the double spin asymmetry as function of $x_{\{\gamma\}}$. A tagging method is used to probe the flavor of the parton content experimentally. In addition, we will discuss the effects of the underlying event on these measurements.

Primary author: Mrs XIAOXUAN, Chu (Central China Normal University)

Presenter: Mrs XIAOXUAN, Chu (Central China Normal University)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 136

Type: **not specified**

Energy dependence of exclusive J/Psi photoproduction in p-Pb interactions at ALICE

Wednesday, April 18, 2018 2:24 PM (24 minutes)

The electromagnetic field of a fast moving lead ion at the LHC is an intense source of quasi-real photons. This makes it possible to study J/Psi exclusive photoproduction off protons in p-Pb collisions at the LHC. This process is sensitive to the gluon content of the target. Measuring the scattering angle of the produced vector meson one can compute the centre-of-mass energy (W) of the photon-proton scattering.

Using Run1 data, ALICE has measured the exclusive J/Psi photoproduction cross section in a wide range of scattering angles. In this contribution, we present for the first time measurements of the cross section using the central-barrel detectors of the ALICE, as well as cross sections for a novel topology where one of the muons from the decay of the J/Psi is detected with the forward-muon spectrometer and the other muon with the central-barrel detectors. This allow us to study the evolution of the cross section with energy in a continuous way in the range $20 \text{ GeV} < W < 700 \text{ GeV}$. The measurements are compared to the newest models of this process.

Primary author: CONTRERAS NUNO, Jesus Guillermo (Czech Technical University (CZ))

Presenter: CONTRERAS NUNO, Jesus Guillermo (Czech Technical University (CZ))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 137

Type: **not specified**

Nucleon spin structure from lattice QCD

Thursday, April 19, 2018 11:50 AM (30 minutes)

We will present results on the nucleon spin decomposition and the momentum distribution among quarks in the nucleon. Techniques for lattice QCD simulations at the physical pion mass applied for the computation of sea-quark and gluon contributions will be presented. We will discuss several challenges and perspectives for future developments.

Primary authors: Prof. ALEXANDROU, Constantia; HADJIYIANNAKOU, Kyriakos (The Cyprus Institute); Prof. CONSTANTINO, Martha (Temple University); KOUTSO, Giannis (The Cyprus Institute); Dr VAQUERO, Alejandro (University of Utah); Dr KALLIDONIS, Christos (Stonybrook University); JANSEN, Karl (DESY)

Presenter: HADJIYIANNAKOU, Kyriakos (The Cyprus Institute)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 138

Type: **not specified**

Accessing generalized TMDs through double Drell-Yan and double η_c production processes

Thursday, April 19, 2018 10:00 AM (20 minutes)

Being the “mother distributions” of all types of two-parton correlation functions, generalized TMDs (GTMDs) have garnered a lot of attention. We address the important question of how to access GTMDs in physical processes. Recently, we have shown that quark GTMDs can in principle be probed through the exclusive pion-nucleon double Drell-Yan process, where the focus was on two particular GTMDs only. We now present new results concerning access to the remaining quark GTMDs in the same process. We also extend our study to the nucleon-nucleon double Drell-Yan process which is sensitive to chiral-odd GTMDs. Moreover, we show that GTMDs for gluons can be explored via exclusive double η_c production in hadronic collisions.

Primary authors: BHATTACHARYA, Shohini (Temple University, Philadelphia); METZ, Andreas (Temple University, Philadelphia); OJHA, Vikash Kumar (ShanDong University); TSAI, Jeng-Yuan (Temple University, Philadelphia); ZHOU, Jian (ShanDong University)

Presenter: BHATTACHARYA, Shohini (Temple University, Philadelphia)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 139

Type: **not specified**

Measurement of the Total Cross-Section and the rho-Parameter at 13 TeV by TOTEM

Wednesday, April 18, 2018 5:18 PM (24 minutes)

The TOTEM experiment at the interaction point 5 of the LHC has measured the total, elastic and inelastic proton-proton cross sections in a centre-of-mass energy range from 2.76 to 13 TeV, in dedicated fills with special beam optics.

Most recently, TOTEM has performed the first measurement of the rho; parameter at $\sqrt{s} = 13$ TeV, where rho is the ratio between the real and the imaginary part of the nuclear elastic scattering amplitude at $t = 0$.

The unprecedented precision of the measurement, combined with the TOTEM total cross-section measurements, led to the exclusion of all the models classified and published by COMPETE. The rho; and σ_{tot} results obtained by TOTEM are compatible with predictions – from alternative theoretical models both in the Regge-like framework and in the modern QCD framework – of a colourless 3-gluon bound state exchange in the t-channel of the proton-proton elastic scattering.

Primary author: ROBUTTI, Enrico (INFN e Universita Genova (IT))

Co-author: TOTEM COLLABORATION

Presenter: ROBUTTI, Enrico (INFN e Universita Genova (IT))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 140

Type: **not specified**

Measurements of the Higgs properties with Run2 data in the bosonic channels

Wednesday, April 18, 2018 10:20 AM (20 minutes)

Measurement of the properties of the Higgs boson, especially in the gamma-gamma and ZZ channels, are reported.

Primary author: GALLO, Elisabetta (DESY)

Co-author: CMS COLLABORATION

Presenter: GALLO, Elisabetta (DESY)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 141

Type: **not specified**

Standard Model Higgs boson decays into fermions

Wednesday, April 18, 2018 10:00 AM (20 minutes)

Observation of Higgs in tautau is reported, together with results from Higgs in bb and mumu decays.

Primary author: WEN, Yiwen (Deutsches Elektronen-Synchrotron (DE))

Co-author: CMS COLLABORATION

Presenter: WEN, Yiwen (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 142

Type: **not specified**

Dark Matter searches with the ATLAS Detector

Wednesday, April 18, 2018 11:50 AM (20 minutes)

As evinced by multiple astrophysical measurements, a large fraction of the matter in the Universe is in the form of a dark, non-baryonic component. If dark matter interacts weakly with the Standard Model it could be produced at the LHC, escaping the detector and thus leaving a signature of large missing transverse momentum. A broad and systematic search program for dark matter production in the LHC collisions recorded by the ATLAS detector is in place: the latest results of these searches will be presented.

Primary author: KALDERON, William (Lund University (SE))

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: KALDERON, William (Lund University (SE))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 143

Type: **not specified**

Global description of bottomonium suppression in proton-nucleus and nucleus-nucleus collisions at LHC energies

Wednesday, April 18, 2018 4:50 PM (20 minutes)

Thanks to an improved comover interaction model, we show that we can reach a global and coherent description of bottomonium suppression in both proton-nucleus and nucleus-nucleus collisions as measured by the CMS and ATLAS collaboration at the LHC. The measured relative suppression of the excited bottomonium states as compared to their ground state in proton-nucleus collisions allows us to constrain the scattering cross sections between the bottomonia and comovers also created during the collisions. Our result hints at a similar momentum distribution of these comovers in the environment created by proton-nucleus and nucleus-nucleus collisions. Along the way of our study, we also update our knowledge for the bottomonium feed-down pattern in the kinematical region relevant for such studies. Besides, we improve our knowledge on the modification of the nuclear parton distribution functions in proton-nucleus collisions.

Primary authors: GONZALEZ FERREIRO, Elena (Universidade de Santiago de Compostela (ES)); LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

Presenter: GONZALEZ FERREIRO, Elena (Universidade de Santiago de Compostela (ES))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 144

Type: **not specified**

Results for Heavy Flavor and Quarkonium production in high multiplicity p+p and p+A collisions in the CGC framework

Thursday, April 19, 2018 9:48 AM (24 minutes)

Heavy quark pair production in minimum bias p+p and p+A collisions has been studied extensively in the CGC framework and compared successfully to both the RHIC and LHC data on J/ψ production [1, 2], $\psi(2S)$ production [3] and D -meson production [4]. We first present an update in this framework based on comparisons to the latest LHC and RHIC data on p+p and light-heavy ion collisions. We will then present novel results [5] on extensions of these studies of Heavy Flavor and Quarkonia to rare events; this work, in completion, demonstrates that this framework captures the systematics of both Heavy-Flavor and Quarkonium production as a function of N_{charge} at both RHIC and the LHC. Finally, we will discuss the importance of Sudakov resummations in this framework to describe Υ production [6, 7].

[1] Y. Q. Ma and R. Venugopalan, Phys. Rev. Lett. 113, no. 19, 192301 (2014).

[2] Y. Q. Ma, R. Venugopalan and H. F. Zhang, Phys. Rev. D 92, 071901 (2015).

[3] Y. Q. Ma, R. Venugopalan, K. Watanabe and H. F. Zhang, arXiv:1707.07266 [hep-ph].

[4] H. Fujii and K. Watanabe, Nucl. Phys. A 920, 78 (2013).

[5] Y. Q. Ma, P. Tribedy, R. Venugopalan, and K. Watanabe, in preparation.

[6] K. Watanabe and B. W. Xiao, Phys. Rev. D 92, no. 11, 111502 (2015).

[7] J. W. Qiu and K. Watanabe, arXiv:1710.06928 [hep-ph].

Primary author: WATANABE, Kazuhiro (ODU/JLab)

Co-authors: MA, Yan-Qing (PKU); TRIBEDY, Prithwish (Brookhaven National Lab); VENUGOPALAN, Raju (Brookhaven National Laboratory)

Presenter: WATANABE, Kazuhiro (ODU/JLab)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 145

Type: **not specified**

Searches for additional Higgs bosons in the MSSM

Wednesday, April 18, 2018 5:30 PM (20 minutes)

The MSSM predicts the existence of additional neutral and charged Higgs bosons. This presentation will discuss results from recent searches for these particles in several decay channels based on collision data collected at 13 TeV, and their interpretation within the MSSM.

Primary authors: REBUZZI, Daniela (Universita e INFN, Pavia (IT)); LOPEZ SOLIS, Alvaro (University of Sheffield)

Presenter: LOPEZ SOLIS, Alvaro (University of Sheffield)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 146

Type: **not specified**

Massive charged-current DIS at NNLO and impact on strange-quark distributions

Wednesday, April 18, 2018 3:30 PM (15 minutes)

We present calculation of next-to-next-to-leading order QCD corrections to massive charged-current coefficient functions in deep-inelastic scattering. Especially we focus on the application to charm-quark production in neutrino scattering on fixed target that can be measured via the dimuon final state.

Primary author: Dr GAO, Jun (Jiao Tong University, Shanghai)

Presenter: Dr GAO, Jun (Jiao Tong University, Shanghai)

Session Classification: WG1-WG5 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 147

Type: **not specified**

[thru #154 assigned] Coherent vector meson production at an electron ion collider

Exclusive vector meson electroproduction over a broad Q^2 range offers a unique opportunity to probe the gluon structure of nuclei to measure nuclear shadowing, and to search for gluon saturation and/or the colored glass condensate at an Electron-Ion Collider. Understanding the kinematic distributions and cross sections for specific processes can impact detector design to maximize their acceptance and strengthen the physics case. We will discuss predictions from a Monte Carlo generator eSTARlight, a tool developed to study production of exclusive vector meson final states. We present final state distributions and production rates for the ρ , ϕ , J/ψ , ψ' and the Υ states in ep and eA collisions at the different energies.

Primary authors: Dr LOMNITZ, Michael (Lawrence Berkeley National Lab.); KLEIN, Spencer (University of California Berkeley (US))

Presenter: Dr LOMNITZ, Michael (Lawrence Berkeley National Lab.)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 148

Type: **not specified**

Overview of EIC physics goals

Tuesday, April 17, 2018 9:00 AM (40 minutes)

The newly proposed Electron-Ion Collider (EIC) with its unique capability to collide polarized electrons with polarized protons and light ions at unprecedented luminosity, and with almost all elements of heavy nuclei at high energy, will be the ideal and much needed facility to explore the emerging science of nuclear femtography, and take us to the next frontier of the Standard Model of physics. In this talk, I will provide an overview of EIC physics goals and challenges to reach them.

Primary author: Dr QIU, Jianwei (Jefferson Lab)

Presenter: Dr QIU, Jianwei (Jefferson Lab)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 149

Type: **not specified**

TMD splitting functions in kT factorization

Wednesday, April 18, 2018 10:12 AM (24 minutes)

We calculate the transverse momentum dependent gluon-to-gluon splitting function within kT-factorization, generalizing the framework employed in the calculation of the quark splitting functions in [1205.1759, 1511.08439, 1607.01507] and demonstrate at the same time the consistency of the extended formalism with previous results. While existing versions of kT factorized evolution equations contain already a gluon-to-gluon splitting function i.e. the leading order BFKL kernel or the CCFM kernel, the obtained splitting function has the important property that it reduces both to the leading order BFKL kernel in the high energy limit, to the DGLAP gluon-to-gluon splitting function in the collinear limit as well as to the CCFM kernel in the soft limit. At the same time we demonstrate that this splitting kernel can be obtained from a direct calculation of the QCD Feynman diagrams, based on a combined implementation of the Curci-Furmanski-Petronzio formalism for the calculation of the collinear splitting functions and the framework of high energy factorization.

Primary authors: KUSINA, Aleksander (Institute of Nuclear Physics PAN); KUTAK, Krzysztof (Instytut Fizyki Jadrowej Polskiej Akademii Nauk); SERINO, Mirko; HENTSCHINSKI, Martin (Universidad de las Americas, Puebla)

Presenter: KUSINA, Aleksander (Institute of Nuclear Physics PAN)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 150

Type: **not specified**

Electron Ion Collider in China

Tuesday, April 17, 2018 12:06 PM (18 minutes)

In this talk I will present an overview of the scientific opportunities that would be addressed by the Electron-Ion-Collider in China (EicC).

The polarized EicC will open up a new window to study the one and three dimensions (3D) nucleon structure for both sea and valence quarks and help fully understand the strong interaction.

In the first phase the EicC will be 3~ 5 GeV polarized electron on 12 ~ 25 GeV polarized proton (and ions about 12 GeV/nucleon), with luminosity $\sim 10^{33}$ /cm²/s . We will focus on discuss the EIC plan and its exciting physics potentials.

Primary author: CHEN, Xurong

Presenter: CHEN, Xurong

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 151

Type: **not specified**

Colour Rearrangement for Dipole Showers

Tuesday, April 17, 2018 2:00 PM (25 minutes)

In a recent article (1801.06113), we discussed the possibility of using simple matrix elements to produce probabilities of rearranging the colour chains in dipole shower algorithms. Due to the changed density of larger and smaller dipole chains, particle spectra and standard observables are modified. In the talk, I will discuss the idea and the consequences for tuning and the soft model of event generators. Comparisons to collider data from LEP, HERA and LHC are included.

Primary author: BELLM, Johannes (Lund)

Presenter: BELLM, Johannes (Lund)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 152

Type: **not specified**

Inclusive photon production to NLO at small x as a probe of gluon saturation

Tuesday, April 17, 2018 9:48 AM (24 minutes)

We report on a first NLO computation of inclusive photon production at small x in $e+A$ collisions. The computation is performed to next-to-leading-log x accuracy and resums all multiple scattering (higher twist) computations within the CGC effective theory. In the soft photon (Low) limit, we recover results the NLO results of Balitsky and Chirilli for inclusive DIS. We point to key technical improvements of our computation relative to the latter which opens the door to more efficient small x computations. We also discuss the relation of this work to analogous computations by us for $p+A$ collisions.

Primary author: Dr VENUGOPALAN, Raju (BNL)

Presenter: Dr VENUGOPALAN, Raju (BNL)

Session Classification: WG2: Small- x and Diffraction

Track Classification: WG2: Small- x and Diffraction

Contribution ID: 153

Type: **not specified**

Strange and non-strange quark distributions from the collider data

Tuesday, April 17, 2018 2:00 PM (20 minutes)

Results of the QCD analysis of a variety of the hard-scattering data is over-viewed with a particular focus on determination of the quark distributions in the nucleon. A potential of the recent precise data collected at the LHC for the problem of quark species disentangling is discussed and compared to the impact of the low-energy fixed-target data. Finally, remaining challenges and potential improvements in the field are outlined.

Primary author: ALEKHIN, Serguei (State Res.Center of Russian Feder. Inst.f.High Energy Phys. (IFVE))

Co-authors: MOCH, S. (UHH); Prof. BLUEMLEIN, Johannes (DESY)

Presenter: ALEKHIN, Serguei (State Res.Center of Russian Feder. Inst.f.High Energy Phys. (IFVE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 154

Type: **not specified**

Coherent vector meson production at an electron ion collider

Wednesday, April 18, 2018 9:48 AM (18 minutes)

Exclusive vector meson electroproduction over a broad Q^2 range offers a unique opportunity to probe the gluon structure of nuclei to measure nuclear shadowing, and to search for gluon saturation and/or the colored glass condensate at an Electron-Ion Collider. Understanding the kinematic distributions and cross sections for specific processes can impact detector design to maximize their acceptance and strengthen the physics case. We will discuss predictions from a Monte Carlo generator eSTARlight, a tool developed to study production of exclusive vector meson final states. We present final state distributions and production rates for the ρ , ϕ , J/ψ , ψ' and the Υ states in ep and eA collisions at the different energies.

Primary authors: LOMNITZ, Michael (Lawrence Berkeley National Lab.); KLEIN, Spencer (University of California Berkeley (US))

Presenter: LOMNITZ, Michael (Lawrence Berkeley National Lab.)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 155

Type: **not specified**

PDF Flavor Determination and the nCTEQ15 PDFs

Wednesday, April 18, 2018 11:50 AM (20 minutes)

We use nCTEQ15 nPDFs with uncertainties to identify measurements which have a potential impact on nuclear corrections and flavor differentiation. In particular, recent LHC W/Z vector boson production data in proton-lead and lead-lead collisions are quite sensitive to heavier flavors (especially the strange PDF). This complements the information from neutrino-DIS data. As the proton flavor determination is dependent on nuclear corrections (from heavy target DIS, for example), this information can also help improve proton PDFs.

Primary authors: GODAT, Eric (Southern Methodist University); JEZO, Tomas (University of Zurich); KEPPEL, Cynthia (Jefferson Lab); KOVARIK, Karol; KUSINA, Aleksander (Institute of Nuclear Physics PAN); MORFIN, Jorge G. (Fermilab); OLNESS, Fred (Southern Methodist University); OWENS, Joseph (Florida State University); SCHIENBEIN, Ingo (Universite Joseph Fourier); Dr YU, Ji-Young (LPSC)

Presenter: OLNESS, Fred (Southern Methodist University)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 156

Type: **not specified**

Accessing quark helicity in e^+e^- and SIDIS via dihadron correlations.

Wednesday, April 18, 2018 5:00 PM (20 minutes)

The correlation between the longitudinal polarization of a fragmenting quark and the transverse momenta of the produced hadrons was predicted over two decades ago. Nevertheless, experimental searches in the electron-positron annihilation process, both through the so-called jet handedness measurement by the SLD collaboration and more recently via the helicity-dependent dihadron fragmentation function (DiFF) by the BELLE collaboration, did not yield a signal. In this talk, we will first explain the zero result at BELLE, and describe new method for accessing the helicity-dependent DiFF in the same experiment. We will also propose another measurement of the same DiFF in semi-inclusive deep inelastic scattering experiments.

Primary author: MATEVOSYAN, Hrayr (University of Adelaide)

Co-authors: KOTZINIAN, Aram (A.Alikhanyan National Laboratory (AM)); THOMAS, Anthony (University of Adelaide)

Presenter: MATEVOSYAN, Hrayr (University of Adelaide)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 157

Type: **not specified**

Subnuclear fluctuations in vector meson photoproduction: a window to saturation

Wednesday, April 18, 2018 3:36 PM (24 minutes)

We present a model of coherent and incoherent photoproduction of vector mesons off proton and off nuclear targets. The computations are performed within the color-dipole formalism. The targets are described by a profile, in the impact parameter space, including subnucleon degrees of freedom, so-called hot spots. Their positions change event by event. The key aspect of our model is that the number of hot spots grows with energy.

We show that the measurement of dissociative production off protons and incoherent production off nuclear targets at different energies offers new signatures of saturation. These measurements can be performed with current LHC data. This work is based on results presented in Phys.Lett. B766 (2017) 186-191 and arXiv:1711.01855 (accepted by PRC). We will also present new results from our model.

Primary authors: CONTRERAS NUNO, Jesus Guillermo (Czech Technical University (CZ)); TAPIA TAKAKI, Daniel (The University of Kansas (US)); CEPILA, Jan (Czech Technical University (CZ)); Dr KRELINA, Michal (Universidad Técnica Federico Santa María)

Presenter: CONTRERAS NUNO, Jesus Guillermo (Czech Technical University (CZ))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 158

Type: **not specified**

Forward di-jets in p+A collisions in the ITMD framework

Wednesday, April 18, 2018 9:24 AM (24 minutes)

We improve the state-of-the-art description of the disappearance of the away-side peak in forward pA collisions at Relativistic Heavy Ion Collider (RHIC) energies in the framework of the Color Glass Condensate (CGC).

Using the recently proposed improved transverse momentum dependent (ITMD) factorization formula for two-particle production in the back-to-back limit, we derive a parameter-free cross section for the production of two hadrons in dilute-dense collisions, in which the TMD gluon distributions describing the saturated targets are obtained by solving the Balitsky-Kovchegov equation with running coupling corrections.

The resulting cross section provides a good description of the disappearance of the away-side peak in d+Au collisions observed in current RHIC data, although non-CGC effects missing in our calculation prevent us from capturing the overall shape of the di-hadron yield as we move away from $\Delta\phi = \pi$.

We predict the away-side peak of upcoming p+Au data at $\sqrt{s} = 200$ GeV to be systematically suppressed by a factor 2 with respect to p+p.

We propose to study the rapidity dependence of the away-side peak suppression as an auxiliary strong proof of gluon saturation in experimental data.

Primary authors: MATAS, Marek; MARQUET, Cyrille (CPHT - Ecole Polytechnique)

Presenter: MATAS, Marek

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 159

Type: **not specified**

Dihadron correlations in polarized quark hadronization.

Wednesday, April 18, 2018 5:20 PM (20 minutes)

We present our recent calculations of the complete set of the leading-twist quark-polarization-dependent dihadron fragmentation functions (DiFFs) to pion pairs. The quark-jet framework is used to model the sequential hadronization of a polarized quark into hadrons, where the polarization transfer to the remnant quark in each hadron emission step is calculated using the spin density matrix formalism. Using Monte Carlo (MC) simulations of the hadronization process, we find non vanishing signal for both helicity- and transverse-polarization-dependent DiFFs. A method is developed for extracting the angular moments of these DiFFs, which enter the expressions for the azimuthal asymmetries for an electron-positron annihilation process into two pairs of hadrons from back-to-back jets and the dihadron production in semi-inclusive deep inelastic scattering. Finally, we derive explicit integral expressions for all four DiFFs where only two hadrons are emitted by a quark and use them to validate our MC results. We also utilize these expressions to study the underlying mechanism for generating the dihadron asymmetries in our sequential hadron emission framework, and discover the crucial role played by the Collins effect.

Primary author: MATEVOSYAN, Hrayr (Adelaide University)

Co-authors: KOTZINIAN, Aram (A.Alikhanyan National Laboratory (AM)); THOMAS, Anthony (University of Adelaide)

Presenter: MATEVOSYAN, Hrayr (Adelaide University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: **160**Type: **not specified**

PDF constraints from top-quark pair differential measurements

Wednesday, April 18, 2018 2:35 PM (20 minutes)

Constraints on parton distribution functions are presented that are based on differential cross-section measurements of single lepton and dilepton kinematic distributions in dileptonic top quark pair events. The measurements utilize 20.2 fb⁻¹ of $\sqrt{s} = 8$ TeV pp collisions recorded by the ATLAS experiment at the LHC. The sensitivity of the cross-sections to the gluon parton distribution function is explored.

Co-author: REBUZZI, Daniela (Universita e INFN, Pavia (IT))

Presenter: GARCIA NAVARRO, Jose Enrique (Univ. of Valencia and CSIC (ES))

Session Classification: WG1-WG5 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 161

Type: **not specified**

Status of the BELLE II experiment and early physics program

Thursday, April 19, 2018 11:20 AM (20 minutes)

The Belle II experiment is a substantial upgrade of Belle detector and will operate at the SuperKEKB energy-asymmetric e^+e^- collider. The accelerator has successfully completed the first phase of commissioning; collisions will start early April 2018. The design luminosity is $8 \times 10^{35} \text{ cm}^{-2}\text{s}^{-1}$ and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than the Belle experiment. This large data set will be accumulated with low backgrounds and high trigger efficiency in a clean e^+e^- environment; it will allow to probe New Physics scales that are well beyond the reach of direct production at the LHC, and will complement the searches through indirect effects that are currently ongoing or planned. This talk will review the detector upgrade, and present the early physics program, centered on bottomonium studies..

Primary author: HIGUCHI, Takeo (KEK)

Co-author: PERUZZI, Ida (Laboratori Nazionali di Frascati dell'INFN)

Presenter: HIGUCHI, Takeo (KEK)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 162

Type: **not specified**

Exotic and conventional bottomonium studies at BELLE II

Wednesday, April 18, 2018 12:30 PM (20 minutes)

The Belle II experiment, about to start taking data at the KEK laboratory in Japan, is a substantial upgrade of both the Belle detector and the KEKB accelerator.

It aims to collect 50 times more data than existing B-Factory samples beginning in early April 2018. Belle II is uniquely capable to study the so-called “XYZ” particles: heavy exotic hadrons consisting of more than three quarks.

First discovered by Belle, these now number in the dozens, and represent the emergence of a new category within quantum chromodynamics.

This talk will present the capabilities of Belle II to explore exotic and conventional bottomonium physics.

There will be a particular focus on the physics reach of the first data, where opportunities exist to make an immediate impact in this area.

Primary author: TAMPONI, UMBERTO (INFN - National Institute for Nuclear Physics)

Co-author: PERUZZI, Ida (Laboratori Nazionali di Frascati dell’INFN)

Presenter: TAMPONI, UMBERTO (INFN - National Institute for Nuclear Physics)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 163

Type: **not specified**

Measuring gluon Sivers function at a future Electron-Ion Collider

Tuesday, April 17, 2018 3:30 PM (30 minutes)

In this work, we present a systematic study on the feasibility of probing the largely unexplored gluon Sivers function (GSF) based on the open charm production, charged dihadron and dijet method at a future high energy, high luminosity Electron-Ion Collider (EIC). Sivers function describes the anisotropy of parton distributions inside a transversely polarized nucleon in the momentum space and provides us a complete picture of the 2+1D structure of the nucleons. It is proposed that the GSF can be studied through the single spin asymmetry (SSA) measurement in the photogluon fusion channel with electron proton collisions at the EIC. Using a well tuned Monte Carlo model for deep inelastic scatterings, we estimate the possible constraints of the gluon Sivers effect one can draw from the future EIC data. Comparisons of all the possible measurements further illustrate that the dijet method is the most promising way to demonstrate the presence of GSF and pin down its evolution effect.

Primary author: ZHENG, Liang (China University of Geosciences (Wuhan))

Co-authors: ASCHENAUER, elke-caroline (BNL); LEE, J.H. (Brookhaven National Laboratory); XIAO, Bowen (Central China Normal University); YIN, Zhong-Bao (Central China Normal University CCNU (CN))

Presenter: ZHENG, Liang (China University of Geosciences (Wuhan))

Session Classification: WG6-WG7 Joint Session

Track Classification: WG7: Future of DIS

Contribution ID: 164

Type: **not specified**

Kaon multiplicity of SIDIS on the deuteron

Thursday, April 19, 2018 11:40 AM (20 minutes)

We study the kaon multiplicity of semi-inclusive DIS off the deuteron target with the updated parton distribution functions and fragmentation functions and compare our result with the HERMES data and COMPASS data. We demonstrated the tension between the HERMES data and COMPASS data and will provide our opinion about this tension. We will make comment about the extracted values of the strange PDF from HERMES data.

Primary authors: KAO, Chung Wen (Chung Yuan Christian University, Department of Physics); Mr YANG, Dong=Jing (National normal University); Prof. CHANG , Wen Chen (Academia Sinica)

Presenter: KAO, Chung Wen (Chung Yuan Christian University, Department of Physics)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 165

Type: **not specified**

NNLO predictions for jets and V+jet at the LHC

Wednesday, April 18, 2018 9:00 AM (30 minutes)

The production of jets and electroweak gauge bosons in association with a jet, V+jet, constitute two important classes of standard-candle processes at the LHC. Owing to the large event rate and the direct sensitivity to the strong coupling constant and the gluon PDF, they provide an ideal testing ground for our understanding of perturbative QCD in a hadron-collider environment.

I give an overview of the recent theory development for these processes and present phenomenological results and their impact on the interpretation of experimental data.

Primary authors: CURRIE, James; GEHRMANN-DE RIDDER, Aude (ETH, Zurich); GEHRMANN, Thomas (Univ. Zurich); GLOVER, Nigel (Durham University); HUSS, Alexander Yohei (CERN); PIRES, Joao (Milano Bicocca); WALKER, Duncan (Durham University)

Presenter: HUSS, Alexander Yohei (CERN)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 166

Type: **not specified**

A space-time analysis of semi-inclusive deep inelastic scattering on nuclei

Wednesday, April 18, 2018 10:06 AM (18 minutes)

A new analysis of published experimental data from the HERMES experiment has been performed. This analysis extracts new information on the space-time properties of color propagation through fitting to a geometric model of the interaction with a realistic nuclear density distribution. Our approach uses a simultaneous fit to the transverse momentum broadening observable and the hadronic multiplicity ratio; the simultaneous fit to two different observables strongly constrains the outcome. We extract the color lifetime, or production time, for the first time. We also extract estimates for the \hat{q} transport coefficient characterizing the strength of the interaction between the quark and the cold nuclear medium transverse to the direction of the quark. With a three-parameter model we obtain satisfactory fits to the data for the kinematic conditions approximately corresponding to the current fragmentation region. Quark energy loss was also parametrized using a 4-parameter variant of the model, and it was found not to play a significant role in describing the data. We note the important impact of the functional form of the distribution of production lengths on present and future data. Using simple kinematic arguments, we use these results to predict the color lifetime for typical kinematic conditions for 5 GeV measurements at Jefferson lab, for 11 GeV beam at the upgraded Jefferson Lab, and at the energies of the future Electron-Ion Collider.

Primary authors: BROOKS, William King (Federico Santa Maria Technical University (CL)); Mr LOPEZ LOPEZ, Jorge Andres (Federico Santa Maria Technical University (CL))

Presenter: Mr LOPEZ LOPEZ, Jorge Andres (Federico Santa Maria Technical University (CL))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 167

Type: **not specified**

[Cancelled] Angular correlations in $\gamma + 2$ jet events at high energies in the parton Reggeization approach

We calculate the different angular distribution spectra of γ -jet and jet-jet pairs in associated $\gamma + 2$ jet production at the energies of the Tevatron and the LHC Colliders in the leading order approximation of the parton Reggeization approach [1-3]. Last one is based on high-energy factorization (k_T -factorization) and L.N. Lipatov's Effective Theory of Reggeized gluon and quarks. The contribution from $QR \rightarrow qq\gamma$ and $RR \rightarrow q\bar{q}\gamma$ subprocesses with Reggeized initial partons is considered. We compare our predictions with existing experimental data as well as with the parton model calculations at the NLO level. The relation between single parton scattering and double parton scattering production mechanisms in these processes is also studied.

[1] M. A. Nefedov, V. A. Saleev and A. V. Shipilova, *Dijet azimuthal decorrelations at the LHC in the parton Reggeization approach*. Phys. Rev. D **87** (2013) no.9, 094030

[2] A. V. Karpishkov, M. A. Nefedov and V. A. Saleev, *$B\bar{B}$ angular correlations at the LHC in parton Reggeization approach merged with higher-order matrix elements*. Phys. Rev. D **96** (2017) no.9, 096019

[3] M. Nefedov and V. Saleev, *Diphoton production at the Tevatron and the LHC in the NLO approximation of the parton Reggeization approach*. Phys. Rev. D **92** (2015) no.9, 094033

Primary authors: Mr KARPISHKOV, Anton (Samara National Research University); Dr NEFEDOV, Maxim (Samara National Research University); Prof. SALEEV, Vladimir (Samara National Research University); Dr SHIPILOVA, Alexandera (Samara National Research University)

Presenter: Mr KARPISHKOV, Anton (Samara National Research University)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 168

Type: **not specified**

The SHiP experiment at CERN

Thursday, April 19, 2018 10:20 AM (20 minutes)

SHiP is a new general purpose fixed target facility, whose Technical Proposal has been reviewed by the CERN SPS Committee and by the CERN Research Board. The two boards recommended that the experiment proceeds further to a Comprehensive Design phase in the context of the new CERN Working group “Physics Beyond Colliders”, aiming at presenting a CERN strategy for the European Strategy meeting of 2019. In its initial phase, the 400 GeV proton beam extracted from the SPS will be dumped on a heavy target with the aim of integrating 2×10^{20} pot in 5 years. A dedicated detector, based on a long vacuum tank followed by a spectrometer and particle identification detectors, will allow probing a variety of models with light long-lived exotic particles and masses below $O(10)$ GeV / c^2 . The main focus will be the physics of the so-called Hidden Portals, i.e. search for Dark Photons, Light scalars and pseudo-scalars, and Heavy Neutrinos. The sensitivity to Heavy Neutrinos will allow for the first time to probe, in the mass range between the kaon and the charm meson mass, a coupling range for which Baryogenesis and active neutrino masses could also be explained. Another dedicated detector will allow the study of neutrino cross-sections and angular distributions. $\nu\tau$ deep inelastic scattering cross sections will be measured with a statistics 1000 times larger than currently available, with the extraction of the F4 and F5 structure functions, never measured so far and allow for new tests of lepton non-universality with sensitivity to BSM physics.

Primary author: CAMPANELLI, Mario (University College London (UK))

Co-author: SHiP, Collaboration

Presenter: CAMPANELLI, Mario (University College London (UK))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 169

Type: **not specified**

Study of the exotic charmonium-like states from lattice QCD

Wednesday, April 18, 2018 12:10 PM (20 minutes)

The charmonium spectroscopy is studied from lattice QCD. An extensive set of excited states as well as the states with exotic quantum numbers are obtained. In this talk, I present and discuss the results in light of experimental observations. In particular, I will discuss the lightest hybrid meson supermultiplet that is identified in our results. Additionally, I will present a preliminary study of the coupled scattering channels $D\bar{D}^*$, $D^*\bar{D}^*$, $J/\Psi\pi$, $\eta_c\rho$, which will shed some light on the structure of the charged charmonium-like states $Z_c(3900)$ and $Z_c(4025)$.

Primary author: LIU, Liuming (Institute of Modern Physics, Chinese Academy of Sciences)

Presenter: LIU, Liuming (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 171

Type: **not specified**

Large transverse momentum top production at NLO+NLL accuracy

Tuesday, April 17, 2018 3:00 PM (20 minutes)

We present an upgrade of the venerable FONLL code to handle top quark production. Predictions for large transverse momentum distributions at NLO+NLL accuracy are presented. Comparisons to recent experimental data, and to NNLO fixed order predictions and to SCET resummations, as well as to Monte Carlos matched to NLO predictions, are performed. Phenomenological relevance of the large transverse momentum resummation at a future FCC hadron collider is investigated.

Primary authors: CACCIARI, Matteo (LP THE Jussieu); RE, Emanuele (CERN); DREYER, Frederic Alexandre (MIT)

Presenter: CACCIARI, Matteo (LP THE Jussieu)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 172

Type: **not specified**

The complete twist-4 contributions to the SIDIS process $e^-N \rightarrow e^-q(\text{jet})X$ at high energies

Tuesday, April 17, 2018 10:30 AM (20 minutes)

The talk will present the complete twist-4 result for the semi-inclusive deeply inelastic scattering $e^-N \rightarrow e^-qX$ with polarized electron and proton beams at the tree level of pQCD. The calculations have been carried out using the formalism obtained after collinear expansion where the multiple gluon scattering are taken into account and gauge links are obtained automatically in a systematical way. The results show in particular that there are twist-4 contributions to all the eight twist-2 structure functions for $e^-N \rightarrow e^-hX$ that correspond to the eight twist-2 transverse momentum dependent parton distribution functions. Such higher twist effects could be very significant and therefore have important impacts on extracting these three-dimensional parton distribution functions from the asymmetry data on $e^-N \rightarrow e^-hX$. The talk will first show the formalism obtained using collinear expansion then present the results for the structure functions and the azimuthal asymmetries. At the end, the talk will present also a discussion of the results obtained and a suggestion of an approximate way for a rough estimation of such higher twist contributions.

References

- [1] Shu-yi Wei, Yu-kun Song, Kai-bao Chen, Zuo-tang Liang, Twist-4 contributions to semi-inclusive deeply inelastic scatterings with polarized beam and target, Phys. Rev. D95, 074017 (2017).
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- [3] Zuo-tang and Xin-Nian Wang, Azimuthal and single spin asymmetry in deep-inelastic lepton-nucleon scattering, Phys. Rev. D75, 094002 (2007).

Primary author: Prof. LIANG, Zuo-tang (Shandong University)

Presenter: Prof. LIANG, Zuo-tang (Shandong University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 173

Type: **not specified**

Determination of electroweak parameters using H1 inclusive DIS data

Tuesday, April 17, 2018 9:20 AM (20 minutes)

An improved determination of electroweak (EW) parameters using H1 inclusive neutral current and charged current DIS cross sections is presented. The analysis benefits from the usage of the previously published cross sections using longitudinally polarised lepton beams. The parameters are determined in a combined fit of EW parameters together with PDFs. The predictions include NNLO QCD corrections for the PDF and structure function calculations, and the corrections at the leptonic vertex are obtained in the on-shell scheme including the full set of 1-loop corrections. The analysis determines the weak neutral-current couplings of the light quarks and thus tests potential contributions beyond the SM. The mass of the W-boson is determined and a precision of 115 MeV is achieved.

Primary author: ZHANG, Zhiqing Philippe (LAL, Orsay (FR))

Co-authors: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE)); COLLABORATION, H1 (DESY)

Presenter: ZHANG, Zhiqing Philippe (LAL, Orsay (FR))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 174

Type: **not specified**

QCD Jets in DIS

Thursday, April 19, 2018 9:00 AM (24 minutes)

We consider lepton-jet correlations in deep inelastic scattering (DIS) as a unique probe of the nucleon/ nuclei tomography. We demonstrate the relevant QCD factorization in terms of transverse momentum dependent quark distributions (TMDs), soft functions and jet functions associated with the final state jet. All relevant large logarithms are resummed to next-to-leading logarithmic (NLL) order. In addition, we consider inclusive jet production and we present numerical results relevant for a future Electron-Ion Collider (EIC).

Primary author: RINGER, Felix (Lawrence Berkeley National Laboratory)

Presenter: RINGER, Felix (Lawrence Berkeley National Laboratory)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 175

Type: **not specified**

W Measurement at PHENIX

Wednesday, April 18, 2018 9:50 AM (20 minutes)

The W measurement at RHIC (Relativistic Heavy Ion Collider) provides unique access to the sea quark polarization of the proton. By measuring decay leptons from parity-violating W bosons, which only coupled to left-handed quarks and right-handed antiquarks, a clean, fragmentation free measurement is possible in addition to natural flavor separation. In this talk, we present status and results of single longitudinal spin asymmetry (A_L) measurements at PHENIX with data collected in 2011-2013.

Primary author: Dr KIM, Chong (UC Riverside)

Presenter: Dr KIM, Chong (UC Riverside)

Session Classification: WG1-WG6 Joint Session

Track Classification: WG6: Spin and 3D structure

Contribution ID: 176

Type: **not specified**

Geometry tagging for heavy ions at JLEIC

Wednesday, April 18, 2018 12:18 PM (18 minutes)

Geometry tagging is an experimental analysis technique for selecting event samples where we can, on a statistical basis, control the geometry of the collision in order to make more incisive physics measurements. This technique has been heavily exploited in heavy ion (AA) collisions at RHIC and the LHC, and played an essential role in the discovery and detailed characterization of the quark gluon plasma, but it has seen only very limited use to date in deep-inelastic scattering. Several physics measurements at the EIC would benefit significantly from the use of this technique, including studies of gluon anti-shadowing, studies of parton propagation, attenuation and hadronization in the nucleus, and ultimately the search for parton saturation. Using geometry tagging, we can create an event sample in eAu collisions with a saturation scale or an average path length equivalent to a minimum bias nucleus of size $A=600-800$. The JLEIC full-acceptance detector, with full acceptance for forward-going neutrons, protons and nuclear fragments and a high data-taking rate should be ideally suited to such geometry tagging. We improve, tune, and apply existing modeling codes, BeAGLE, Sartre, and GEMC, and detector descriptions to study this physics.

Primary authors: MOROZOV, V.S. (Jefferson Lab, Newport News, VA); ACCARDI, A. (Jefferson Lab, Newport News, VA); BAKER, M. (MDBPADS LLC, Miller Place, NY); BROOKS, W. (Santa Maria University, Valparaiso, Chile); DUPRE, R. (IPN Orsay, Orsay, France); EHRHART, M. (IPN Orsay, Orsay, France); FOGLER, C. (Old Dominion University, Norfolk, VA); HAFIDI, K. (ANL, Lemont, IL); HYDE, C. (Old Dominion University, Norfolk, VA); NADEL-TURONSKI, P. (SUNY, Stony Brook, NY); PARK, K. (Jefferson Lab, Newport News, VA); STUKES, J. (Morehouse College, Atlanta, GA); SY, A. (Jefferson Lab, Newport News, VA); TOLL, T. (Shiv Nadar University, Uttar Pradesh, India); WEI, G. (Jefferson Lab, Newport News, VA); ZHENG, L. (Central China Normal University, Hubei Sheng, China)

Presenter: MOROZOV, V.S. (Jefferson Lab, Newport News, VA)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 177

Type: **not specified**

Status of JLEIC and its interaction region design

Tuesday, April 17, 2018 11:48 AM (18 minutes)

An Electron Ion Collider (EIC) has been identified in the Nuclear Physics Long Range Plan as the highest-priority facility for new construction. This talk presents an overview and status of the Jefferson Lab design of an EIC (JLEIC). It features frequent collisions of small electron and ion bunches providing a luminosity of 10^{33} - 10^{34} $\text{cm}^{-2}\text{s}^{-1}$ in a broad range of the center-of-mass energy. The small size of ion bunches is maintained against intra-beam scattering by a novel high-energy bunched beam electron cooling system. The figure-8 shape of the electron and all ion rings allows for preservation and ease of manipulation of the electron polarization and the spin of any ion species (p, d, ^3He , Li, etc.). The interaction region is designed to accommodate a full-acceptance detector with complete coverage and geometry tagging in the forward and ultra-forward directions. The talk highlights recent progress on the JLEIC accelerator design with an emphasis on the integrated interaction region design.

Primary author: MOROZOV, V.S. (Jefferson Lab, Newport News, VA)

Presenter: MOROZOV, V.S. (Jefferson Lab, Newport News, VA)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 178

Type: **not specified**

Hadronization in Semi-Inclusive DIS from CLAS at Jefferson Lab

Thursday, April 19, 2018 12:20 PM (20 minutes)

In this talk I will present preliminary results on π^+ , π^- and π^0 multiplicity ratios measured as a function of multiple kinematical variables in semi-inclusive DIS on three nuclei (C, Fe, Pb) normalized to deuterium. The series of measurements were performed at Jefferson Lab with 5.014 GeV electron beam incident on a double-target system in which liquid deuterium and one of the solid targets were exposed simultaneously to the beam. These measurements will be further extended in the approved experiment at 11 GeV. The goal is to provide new insights on parton propagation inside nuclear medium and expand current knowledge on hadronization mechanisms. This topic has been of interest to multiple communities: Drell-Yan measurements at Fermilab, heavy-ion collisions in RHIC and LHC and SIDIS measurements from HERMES and CLAS, all of which contribute different kind of information on short distance processes. The advantages of SIDIS are its well understood nuclear medium and ability to investigate time-dependence of hadronization by embedding it in nuclei of increasing size. It is to be hoped that the studies of cold QCD matter, once matured, can influence the interpretation of what is seen in the hot dense systems (LHC), in addition to their intrinsic interest for QCD.

Primary author: MINEEVA, Taisiya (Universidad Tecnica Federico Santa Maria)

Presenter: MINEEVA, Taisiya (Universidad Tecnica Federico Santa Maria)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 179

Type: **not specified**

Transverse Single Spin Asymmetries of charged hadron from p+p and p+Au collisions in PHENIX

Tuesday, April 17, 2018 12:15 PM (20 minutes)

Transverse single-spin asymmetries (TSSA) of light hadron production from $p^\uparrow + p$ collisions provide valuable information on the spin structure of the nucleon. TSSA in the process $p^\uparrow + p \rightarrow h + X$ has been described in terms of twist-3 spin-dependent three-parton correlation functions, or twist-3 fragmentation functions in the QCD collinear factorization approach. In addition, studying the TSSA for inclusive hadron production in $p^\uparrow + A$ collisions can give new insight on the underlying mechanism because different contributions to the TSSA are affected differently by the saturation effect in large nuclei. We will report a recent study on the TSSA of charged hadron production at forward and backward ($1.4 < |\eta| < 2.4$) rapidity over the the transverse momentum range of $1.25 < p_T < 7.0$ GeV/c and Feynman-x range of $-0.2 < x_F < 0.2$ from $p^\uparrow + p$ and $p^\uparrow + \text{Au}$ collisions at $\sqrt{s_{NN}} = 200$ GeV in the PHENIX experiment at RHIC. Nonzero A_N is observed in $p + p$ while surprisingly smaller A_N is measured in $p + \text{Au}$.

Primary author: BOK, Jeongsu (New Mexico State University)

Presenter: BOK, Jeongsu (New Mexico State University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: **180**Type: **not specified**

Study of fragmentation function at Belle

Wednesday, April 18, 2018 4:30 PM (30 minutes)

Precision data taken in e^+e^- annihilation at or near the $Y(4S)$ by the Belle experiment has been instrumental in the extraction of spin dependent and integrated fragmentation functions. In this talk, we report our measurement on the invariant-mass and fractional-energy dependence of inclusive production of di-hadrons. We also report on the production rate of hyperons and charmed baryons, the transverse polarization of lambda hyperons, and other measurements from Belle.

Primary authors: NISHIDA, Shohei (KEK); SEIDL, Ralf (RIKEN)

Presenter: SEIDL, Ralf (RIKEN)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: **181**Type: **not specified**

Study of Charmed Baryons at Belle

Wednesday, April 18, 2018 10:30 AM (20 minutes)

The largest data sample accumulated by the Belle experiment at KEKB asymmetric energy e+e-collider provides an opportunity to perform studies of charmed hadrons. In this presentation, we report on the studies of the decay modes of Λ_c , Ω_c and spectroscopy of excited Ω_c and Ξ_c . The studies presented here use the full data accumulated by the Belle experiment.

Primary authors: NISHIDA, Shohei (KEK); SUMIHAMA, Mizuki (Gifu University)

Presenter: SUMIHAMA, Mizuki (Gifu University)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 182

Type: **not specified**

Study of Quarkonia and Quarkonium-like States at Belle

Wednesday, April 18, 2018 11:50 AM (20 minutes)

The largest data sample accumulated by the Belle experiment at KEKB asymmetric energy e^+e^- collider provides an opportunity to perform studies of bottomonia. We report on the study of bottomonium production in association with an eta meson in e^+e^- annihilations near $Y(5S)$, and the measurement of $e^+e^- \rightarrow \chi_{bJ}\phi, \chi_{bJ}\omega$ near $Y(6S)$. We also present the measurement of the decays $Y(4S) \rightarrow \eta' Y(1S), Y(2S) \rightarrow \gamma \eta_b$ and $Y(1S,2S) \rightarrow Z_c Z_c$, where Z_c is the exotic charmonium-like resonance. Measurements other charmonium-like resonances are also reported.

Primary authors: NISHIDA, Shohei (KEK); JIA, Sen (Beihang University)

Presenter: JIA, Sen (Beihang University)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 183

Type: **not specified**

Study of electroweak-penguin B decays and other rare B decays at Belle

Tuesday, April 17, 2018 10:00 AM (20 minutes)

Electroweak penguin B decays proceed through one loop diagrams at the lowest order. Since new particles beyond the Standard Model can enter in the loop, these processes are very sensitive to new physics. We report measurements of $b \rightarrow sl+l-$ decays at Belle. We also report other rare B decays sensitive to New Physics. The analyses are based on the full data set at $Y(4S)$ and $Y(5S)$ resonances at Belle.

Primary authors: NISHIDA, Shohei (KEK); SANTELJ, Luka (High Energy Accelerator Research Organization (KEK)); SANTELJ, Luka (Jozef Stefan Institute)

Presenters: SANTELJ, Luka (High Energy Accelerator Research Organization (KEK)); SANTELJ, Luka (Jozef Stefan Institute)

Session Classification: WG3-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 184

Type: **not specified**

Measurement of $\eta_c(1S)$, $\eta_c(2S)$ and non-resonant η' $\pi^+ \pi^-$ production in two-photon collisions at Belle

Thursday, April 19, 2018 9:00 AM (25 minutes)

We report the measurements of $\gamma\gamma \rightarrow \eta_c(1S), \eta_c(2S) \rightarrow \eta' \pi^+ \pi^-$ with η' decay to $\gamma\rho$ and $\eta \pi^+ \pi^-$ using 941 fb⁻¹ of data collected with the Belle detector at the KEKB asymmetric-energy $e^+ e^-$ collider. First observation of $\eta_c(2S) \rightarrow \eta' \pi^+ \pi^-$ with a significance 5.5σ including systematic error is obtained. The products of the two-photon decay width and branching fraction of decays to $\eta' \pi^+ \pi^-$ are determined for the $\eta_c(1S)$ and $\eta_c(2S)$, respectively. A new decay mode for the $\eta_c(1S) \rightarrow \eta' f_0(2080)$ with $f_0(2080) \rightarrow \pi^+ \pi^-$ is observed with a statistical significance of 20σ . The cross section for $\gamma\gamma \rightarrow \eta' \pi^+ \pi^-$ and $\eta' f_2(1270)$ are measured for the first time.

Primary author: XU, Qingnian (University of Chinese Academy of Sciences (CN))

Co-author: NISHIDA, Shohei (KEK)

Presenter: XU, Qingnian (University of Chinese Academy of Sciences (CN))

Session Classification: WG4-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 185

Type: **not specified**

Study of K^0_S pair production in single-tag two-photon collisions at Belle

Tuesday, April 17, 2018 12:35 PM (20 minutes)

We report a measurement of the cross section for K^0_S pair production in single-tag two-photon collisions, $\gamma\gamma \rightarrow K^0_S K^0_S$ for Q^2 up to 30 GeV^2 , where Q^2 is the negative of the invariant mass squared of the tagged photon. The measurement covers the kinematic range $1.0 \text{ GeV} < W < 2.6 \text{ GeV}$ and $|\cos\theta| < 1.0$ for the total energy and kaon scattering angle, respectively, in the $\gamma^* \gamma$ center-of-mass system. These results are based on a data sample of 759 fb^{-1} collected with the Belle detector at the KEKB asymmetric-energy $e^+ e^-$ collider. For the first time, the transition form factor of the $f_2(1525)$ meson is measured separately for the helicity-0, -1, and -2 components and also compared with theoretical calculations. Finally, the partial decay widths of the χ_{c0} and χ_{c2} mesons are measured as a function of Q^2 .

Primary authors: NISHIDA, Shohei (KEK); UEHARA, Sadaharu (KEK)

Presenter: UEHARA, Sadaharu (KEK)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 186

Type: **not specified**

Recent QCD-related studies with the BaBar detector

Thursday, April 19, 2018 9:25 AM (25 minutes)

We report some of the most recent results in studying different aspects of QCD with about 500 fb⁻¹ of data collected by the BaBar experiment at the e^+e^- B -factory PEP-II.

Among these, we present a high precision measurement of the mass difference between the $D^*(2010)^+$ and D^+ mesons using the decay chain $D^*(2010)^+ \rightarrow D^+\pi^0$, with $D^+ \rightarrow K^-\pi^+\pi^+$. This result is then combined with a previous BaBar measurement of $m(D^*(2010)^+) - m(D^0)$ to extract the mass difference between the charged and neutral D mesons. We obtain results that are approximately seven times more precise than the present world averages.

We also report on the first evidence for a B -meson decay to four baryons, $B^0 \rightarrow p\bar{p}p\bar{p}$, which can help to shed light on the experimental discrepancy between the inclusive branching fraction of all B meson decay modes with at least a couple of baryons in the final state, measured by ARGUS to be $(6.8 \pm 0.6)\%$, and the sum of exclusive baryonic channels. Finally, we present a measurement of the spectral function for the $\tau^- \rightarrow K^- K_S \nu_\tau$ decay, which can be used to determine the hadronic contribution to the muon $g - 2$ due to the vacuum polarization,

Primary authors: ANULLI, Fabio (Sapienza Universita e INFN, Roma I (IT)); ZANI, Laura (INFN - National Institute for Nuclear Physics)

Presenter: ZANI, Laura (INFN - National Institute for Nuclear Physics)

Session Classification: WG4-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 187

Type: **not specified**

Study of radiative decays of the $\Upsilon(1S)$ and of three-body decays of the J/ψ

Wednesday, April 18, 2018 9:50 AM (20 minutes)

We report on recent studies of quarkonium decays obtained with the data collected by the BaBar experiment at the PEP-II e^+e^- collider.

In particular, we use the entire BaBar dataset to study the reaction $e^+e^- \rightarrow \gamma_{ISR}J/\psi$, with $J/\psi \rightarrow \pi^+\pi^-\pi^0$, $J/\psi \rightarrow K^+K^-\pi^0$, or $J/\psi \rightarrow K_S K^\pm \pi^\mp$, and the photon γ_{ISR} produced via Initial-State-Radiation. We measure the relative J/ψ branching fractions and perform a Dalitz plot analysis of each J/ψ decay mode using an isobar model and a Veneziano model.

We also present a study of the radiative decays of the $\Upsilon(1S)$ to $\pi^+\pi^-\gamma$ and $K^+K^-\gamma$ final states, performed on the data samples collected at the peak of the $\Upsilon(2S)$ and $\Upsilon(3S)$ resonances. The $\Upsilon(1S)$ is reconstructed from the decay chains $\Upsilon(nS) \rightarrow \pi^+\pi^-\Upsilon(1S)$, with $n = 2, 3$. Branching fractions measurements and spin-parity analysis are reported for the $\Upsilon(1S)$ radiative decays to the several intermediate resonances observed in the $\pi^+\pi^-$ and K^+K^- mass spectra.

Primary author: ROBBE, Patrick (Université Paris-Saclay (FR))

Co-author: ANULLI, Fabio (Sapienza Università e INFN, Roma I (IT))

Presenter: ROBBE, Patrick (Université Paris-Saclay (FR))

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 188

Type: **not specified**

Next-to-Leading Order QCD Corrections to Inclusive Heavy-Flavor Production in Polarized Deep-Inelastic Scattering

Thursday, April 19, 2018 12:20 PM (20 minutes)

We provide a first calculation of the complete next-to-leading order QCD corrections for heavy flavor contributions to the inclusive structure function g_1 in longitudinally polarized deep-inelastic scattering. The results are derived with largely analytical methods and retain the full dependence on the heavy quark's mass. We discuss all relevant technical details of the calculation and present numerical results for the heavy quark scaling functions. We perform important crosschecks to verify our results in the known limit of photoproduction and for the unpolarized electroproduction of heavy quarks. We also compare our calculations to the available, partial results in the polarized case, in particular, in the limit of asymptotically large photon virtualities. First steps towards phenomenological applications are taken by providing some estimates for inclusive charm production in polarized deep-inelastic scattering at a future electron-ion collider and studying their sensitivity to the polarized gluon distribution. The residual dependence of heavy quark electroproduction on unphysical factorization and renormalization scales and on the heavy quark mass is investigated.

Primary authors: Mr HEKHORN, Felix (University of Tübingen); Dr STRATMANN, Marco (University of Tübingen)

Presenter: Mr HEKHORN, Felix (University of Tübingen)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: **189**Type: **not specified**

Multiboson production at CMS

Tuesday, April 17, 2018 10:25 AM (25 minutes)

The production of massive vector boson pairs is a key process for the understanding of the non-abelian gauge structure of the standard model and for the comprehension of the electroweak symmetry breaking mechanism. In this presentation, we will report the most recent inclusive and differential measurements of multiboson production with data collected by the CMS. The recent study of the production of vector boson pairs with the presence of two jets in the event will be presented as well. It allows to measure the electroweak production of vector bosons in association with jets, in particular made up through vector boson scattering (VBS) processes.

Primary author: LEVIN, Andrew Michael (Peking University (CN))

Co-author: CMS COLLABORATION

Presenter: LEVIN, Andrew Michael (Peking University (CN))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: **190**Type: **not specified**

alpha_s: Recent developments and future prospects

Wednesday, April 18, 2018 12:20 PM (30 minutes)

I will present the current status of the determination of the QCD coupling α_s from the 15 methods where high-precision theoretical calculations and experimental measurements are (or will be) available including, among others: (i) lattice QCD, (ii) τ hadronic decays, (iii) soft parton-to-hadron fragmentation functions, (iv) proton structure functions, (v) $e+e^-$ event shapes and jet rates, (vi) hadronic W and Z boson decays, and (vii) top-quark cross sections in proton-(anti)proton collisions. The current status of the theoretical and experimental uncertainties associated to each extraction method, the improvements expected from LHC data in the coming years, and future perspectives achievable in $e+e^-$ collisions will be summarized.

Primary author: D'ENTERRIA, David (CERN)

Presenter: D'ENTERRIA, David (CERN)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 192

Type: **not specified**

Longitudinal Double Spin Asymmetry in Jets in $\sqrt{s} = 510$ polarized p+p

Wednesday, April 18, 2018 12:20 PM (20 minutes)

The longitudinal double-spin asymmetry A_{LL} in spin-polarized $p + p$ collisions provides insight into the gluon contribution to the proton's spin by accessing the gluon helicity distribution Δg . Prior RHIC 200 GeV measurements show non-zero asymmetries and hence indicate a nonzero contribution of gluon helicity to the proton spin ΔG for the Bjorken- x range $x > 0.05$ in the recent NLO analyses. The 510 GeV PHENIX π_0 and STAR jet data confirms the non-zero asymmetries and extends constraints on ΔG to lower x . A measurement of the jet A_{LL} at $\sqrt{s} = 510$ GeV in PHENIX will provide an important cross-check. In this talk, I will detail the jet reconstruction techniques tuned for the PHENIX detector and present the status of the measured jet cross section and A_{LL} .

Primary author: PATEL, Milap (Iowa State University)

Presenter: PATEL, Milap (Iowa State University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 193

Type: **not specified**

Threshold and jet radius joint resummation for single-inclusive jet production

Wednesday, April 18, 2018 9:30 AM (30 minutes)

We present the first threshold and jet radius jointly resummed cross section for single-inclusive hadronic jet production. We work at next-to-leading logarithmic accuracy and our framework allows for a systematic extension beyond the currently achieved precision. Longstanding numerical issues are overcome by performing the resummation directly in momentum space within Soft Collinear Effective Theory (SCET). We present numerical results for the LHC with and without the joint resummation for different choices of jet radii and observe that the resummation leads to crucial improvements in the description of the data.

Primary author: RINGER, Felix (Lawrence Berkeley National Laboratory)

Presenter: RINGER, Felix (Lawrence Berkeley National Laboratory)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 194

Type: **not specified**

search for K^+ to $\pi^+ \nu \bar{\nu}$ at NA62

Thursday, April 19, 2018 9:50 AM (25 minutes)

$K \rightarrow \pi \nu \bar{\nu}$ is one of the theoretically cleanest meson decay where to look for indirect effects of new physics complementary to LHC searches. The NA62 experiment at CERN SPS is designed to measure the branching ratio of the $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ decay with 10% precision. NA62 took data in 2015-2017; the analysis of a partial data set allows to reach the Standard Model sensitivity. The status of the experiments will be reviewed, and prospects will be presented.

Primary authors: LAZZERONI, cristina; MASSAROTTI, Paolo (Universita e sezione INFN di Napoli (IT))

Presenter: MASSAROTTI, Paolo (Universita e sezione INFN di Napoli (IT))

Session Classification: WG4-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 196

Type: **not specified**

search for exotic particle at na62

Thursday, April 19, 2018 10:40 AM (20 minutes)

Searches for heavy neutral lepton (HNL) production in charged kaon decays using the data collected by the NA62 experiment at CERN are reported. Upper limits are established on the elements of the extended neutrino mixing matrix for heavy neutral lepton mass in the range 130-450 MeV, improving on the results from previous HNL production searches. The status and prospects of searches for lepton flavour and lepton number violation in kaon decays at the NA62 experiment is also presented.

The high-intensity setup, trigger system flexibility, and detector performance – high-frequency tracking of beam particles, redundant PID, ultra-high-efficiency photon vetoes – make NA62 particularly suitable for searching new-physics effect from different scenarios. Results from a search for invisible dark photons produced from π^0 decays are given.

Fixed target experiments are a particularly useful tool in the search of very weakly coupled particles in the MeV-GeV range,

which are of interest, e.g. as potential Dark Matter mediators. The NA62 experiment at the CERN SPS is currently taking data to measure the ultra-rare

decay $K \rightarrow \pi \nu \bar{\nu}$. Owing to the high beam-energy and a hermetic detector coverage, NA62 also has the opportunity to directly search for a

plathora of long-lived beyond-the Standard Model particles, such as Axion-like Particles and Dark Photons. In this talk, we will review the status of this searches and give prospects for future data taking at NA62.

Primary authors: LAZZERONI, cristina; LOLLINI, Riccardo (Universita e INFN, Perugia (IT))

Presenter: LOLLINI, Riccardo (Universita e INFN, Perugia (IT))

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 197

Type: **not specified**

Future of 3D Imaging at Jefferson Lab

Wednesday, April 18, 2018 5:18 PM (24 minutes)

Jefferson Lab recently completed an electron beam energy upgrade from 6 to 11 GeV. New experiments to study the structure of the nucleon have begun collecting data or are under preparation. The presentation will give an overview of the available detectors and targets in the three experimental halls and outline their experimental programs to image the nucleon three-dimensionally.

Primary author: BUELTMANN, Stephen (Old Dominion University)

Presenter: BUELTMANN, Stephen (Old Dominion University)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 198

Type: **not specified**

Medium-energy Nuclear Physics at RHIC with sPHENIX and an sPHENIX Forward Upgrade

Tuesday, April 17, 2018 12:42 PM (18 minutes)

The proposed sPHENIX detector at the Relativistic Heavy Ion Collider (RHIC), together with RHIC's unique capabilities to collide polarized protons and heavy nuclei, will open the door to exciting new measurements to enhance our understanding of quantum chromodynamics (QCD). These measurements will reveal more about how partons behave in a nuclear environment, explore spin-spin and spin-momentum correlations in the nucleon, and provide data to investigate effects of non-universality. A potential upgrade to sPHENIX with forward instrumentation could significantly enhance these physics capabilities. The medium-energy nuclear physics program for the proposed sPHENIX midrapidity detector as well as the enhanced program enabled with forward upgrades will be presented.

Primary author: Dr NAKAGAWA, itaru (RIKEN)

Co-author: SPHENIX COLLABORATION

Presenter: Dr NAKAGAWA, itaru (RIKEN)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 199

Type: **not specified**

Sea quark Sivers function

In this talk, I will argue that sea quark Sivers function can be dynamically generated through spin dependent odderon. Due to the C-odd nature of odderon, the derived quark Sivers function and anti-quark Sivers function at small x are the same in size, but differ by a minus sign. We further show that sea quark Sivers function computed in CGC is reduced to that obtained in collinear twist-3 approach in the dilute limit. The experimental probe of sea quark Sivers function will also be discussed.

Primary authors: Prof. ZHOU, Jian (ShanDong University); Dr DONG, Hui (ShanDong University); Prof. LIANG, Zuo-tang (ShanDong University); Mr ZHEN, Du-xing (ShanDong University)

Presenter: Prof. ZHOU, Jian (ShanDong University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 200

Type: **not specified**

The Science and Status of the US EIC

Wednesday, April 18, 2018 9:00 AM (30 minutes)

A high-energy high-luminosity polarized Electron Ion Collider (EIC) was enthusiastically recommended

by the US nuclear science advisory committee (NSAC), as the highest priority new facility to be built in the US, in its long range planning exercise conducted in 2015. Understanding the role played by the gluons in binding quarks and gluons in nucleons and nuclei —most of the visible universe —is the central goal of the EIC. We will summarize the science case for the EIC and discuss the status of the project on the path to realization.

Primary author: DESHPANDE, Abhay (Stony Brook University)

Presenter: DESHPANDE, Abhay (Stony Brook University)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 201

Type: **not specified**

Electron-photon deep inelastic scattering at small x in holographic QCD

Tuesday, April 17, 2018 10:12 AM (24 minutes)

A photon is a fundamental particle, instead of a nonperturbative composite like hadrons. However, an energetic photon can fluctuate into vector mesons in the kinematic region with a small Bjorken variable $x < 0.1$. Particularly at $x < 0.01$, the hadronic contribution to cross sections of the electron-photon deep inelastic scattering dominates, and a photon can be regarded as a hadron rather than a pointlike object. Therefore, effective models are needed for studies of the photon structure in this kinematic region. We present analysis on the photon structure functions at small x in the framework of the holographic QCD, assuming dominance of the Pomeron exchange. The real photon structure functions are expressed as convolution of the Brower-Polchinski-Strassler-Tan (BPST) Pomeron exchange kernel and the known wave functions of the U(1) vector field in the five-dimensional AdS space, in which the adjustable parameters in the BPST kernel have been fixed in previous studies of the nucleon structure functions. The predicted photon structure functions, as confronted with experimental data, provide a clean test of the BPST kernel. The agreement between theoretical predictions and data is demonstrated, which supports applications of holographic QCD to hadronic processes in the nonperturbative region. Our calculations are also consistent with those derived from the parton distribution functions of the photon proposed by Gluck, Reya, and Schienbein, implying realization of the vector meson dominance in the present model setup. Our results presented in this talk will be tested at future linear colliders, e.g., the planned International Linear Collider.

Primary author: WATANABE, Akira**Co-author:** LI, Hsiang-nan (Academia Sinica)**Presenter:** WATANABE, Akira**Session Classification:** WG2: Small- x and Diffraction**Track Classification:** WG2: Small- x and Diffraction

Contribution ID: 202

Type: **not specified**

[Cancelled] Search for the rare decays $B^- \rightarrow \Lambda \bar{p} \nu \bar{\nu}$ and $D^0 \rightarrow K \pi e^+ e^-$

Flavor-changing neutral-current (FCNC) decays of the B and D mesons are strongly suppressed in the Standard Model (SM) because they cannot be produced at tree level, and occur first at one-loop level. Therefore, they are sensitive probes for contributions beyond the SM, as heavy mediator can also occur in these loop processes. The analyses presented here are based on the entire dataset collected by the BaBar experiment at the PEP-II e^+e^- collider, at the peak of the $\Upsilon(4S)$ and near it.

The process $B^- \rightarrow \Lambda \bar{p} \nu \bar{\nu}$ is the baryonic analog of $B^- \rightarrow K^{(*)} \nu \bar{\nu}$ occurring in the SM via a $b \rightarrow s \nu \bar{\nu}$ transition through Z -penguin and W -box diagrams, and its branching ratio is predicted to be about 8×10^{-7} . This decay has never been measured before, we observe no signal and set an upper limit at 90% confidence level on the branching fraction.

The FCNC decay $D^0 \rightarrow K \pi e^+ e^-$ is further suppressed by the Glashow-Iliopoulos-Maiani mechanism, but long-distance contributions, involving vector meson dominance or photon pole amplitudes in $D^0 \rightarrow X e^+ e^-$ decays, where X is vector meson, could contribute at the level of $O(10^{-7})$. The BaBar analysis observes no signal but significantly improves on previous upper limits.

Primary author: ROBERTSON, Steven (McGill University, (CA))

Co-author: ANULLI, Fabio (Sapienza Universita e INFN, Roma I (IT))

Presenter: ROBERTSON, Steven (McGill University, (CA))

Session Classification: WG3-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 203

Type: **not specified**

New parton densities with Parton Branching method

Thursday, April 19, 2018 10:40 AM (20 minutes)

We present a determination of parton densities at NLO obtained with the Parton Branching method using HERA precision data. The parton densities are obtained with the standard and angular ordering evolution scales. For integrated pdfs a significant effect is observed.

The transverse momentum dependent (TMD) densities, automatically obtained with the Parton Branching method, are applied to LHC processes, like Drell Yan pt spectrum and high pt dijet correlations.

Primary authors: JUNG, Hannes (Deutsches Elektronen-Synchrotron (DE)); LELEK, Aleksandra Anna (Deutsches Elektronen-Synchrotron (DE)); ZLEBICKI, Radek (Deutsches Elektronen-Synchrotron (DE)); BERMUDEZ MARTINEZ, Armando (CMS-DESY); HAUTMANN, Francesco (Institute of Theoretical Physics)

Presenter: BERMUDEZ MARTINEZ, Armando (CMS-DESY)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 204

Type: **not specified**

State of the art POWHEG generators for Top Mass Measurements at the LHC

Thursday, April 19, 2018 12:00 PM (20 minutes)

We study the theoretical uncertainties in the determination of the top-quark mass using next-to-leading-order (NLO) generators interfaced to parton showers (PS) that have different levels of accuracy. Specifically we consider three generators: one that implements NLO corrections in the production dynamics, one that includes also NLO corrections in top decay in the narrow width approximation, and one that implements NLO corrections for both production and decay including finite-width and interference effects. Our aim is to provide an assessment of the uncertainties of purely theoretical origin, we thus consider simplified top-mass related observables that are broadly related to those effectively used by experiments, eventually modelling experimental resolution effects with simple smearing procedures. Examining these observables with generators of increasing accuracy allows us to assess the theoretical errors due to the use of the less accurate generators. Furthermore, we estimate theoretical uncertainties associated with the variation of scales and with the choice of parton distribution functions. In order to give an indicative assessment of the uncertainties due to the shower and to the modelling of non-perturbative effects, we interface our NLO+PS generators to both Pythia8.2 and Herwig7.1, with various settings, and compare the results.

Primary authors: FERRARIO RAVASIO, Silvia (Università di Milano - Bicocca); NASON, Paolo (Università & INFN, Milano-Bicocca (IT)); OLEARI, Carlo (Università & INFN, Milano-Bicocca (IT)); JEZO, Tomas (University of Zurich)

Presenter: JEZO, Tomas (University of Zurich)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 205

Type: **not specified**

New NLOPS predictions for b-jet production in association with a pair of top quarks at the LHC

Tuesday, April 17, 2018 12:10 PM (15 minutes)

Measurements of $t\bar{t}H$ production in the $H \rightarrow b\bar{b}$ channel depend in a critical way on the theoretical uncertainty associated with the irreducible $t\bar{t} + b$ -jet background. In this paper, analysing the various topologies that account for b-jet production in association with a $t\bar{t}$ pair, we demonstrate that the process at hand is largely driven by final-state $g \rightarrow b\bar{b}$ splittings. We also show that in five-flavour simulations based on $t\bar{t}$ +multi-jet merging b-jet production is mostly driven by the parton shower, while matrix elements play only a marginal role in the description of $g \rightarrow b\bar{b}$ splittings. Based on these observations we advocate the use of NLOPS simulations of $pp \rightarrow t\bar{t}b\bar{b}$ in the four-flavour scheme, and we present a new POWHEG generator of this kind. Predictions and uncertainties for $t\bar{t} + b$ -jet observables at the 13 TeV LHC are presented both for the case of stable top quarks and with spin-correlated top decays. Besides QCD scale variations we consider also theoretical uncertainties related to the POWHEG matching method and to the parton shower modelling, with emphasis on $g \rightarrow b\bar{b}$ splittings. In general, matching and shower uncertainties turn out to be remarkably small. This is confirmed also by a tuned comparison against Sherpa+OpenLoops.

Primary authors: JEZO, Tomas (University of Zurich); LINDERT, Jonas; MORETTI, Niccolo; POZZORINI, Stefano Augusto (Universitaet Zuerich (CH))

Presenter: JEZO, Tomas (University of Zurich)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 206

Type: **not specified**

Overview of GPD program from Jefferson Lab

Thursday, April 19, 2018 9:00 AM (30 minutes)

Jefferson Laboratory has an extensive program of Deep Virtual Exclusive Scattering (DVES). I will review salient results from the 6 GeV era, and present the status and goals of both Deep Virtual Compton Scattering (DVCS) and Deep Virtual Meson Production (DVMP). A set of DVCS and exclusive π^0 measurements from 7 to 11 GeV have been completed in Hall A. A first JLab observation of J/Ψ photo-production has been reported by the GlueX collaboration in Hall D. DVCS measurements and exclusive vector meson production at 10.6 GeV on the proton are starting this Spring with CLAS12 (Hall B). DVES experiments on a new longitudinally polarized NH_3/ND_3 target are anticipated in the next few years. A new PbWO_4 calorimeter is under construction for future measurements in Hall C. These data will provide new insights on the spatial distribution of quarks and gluons at large- x , as well as higher-twist quark-gluon correlations.

Primary author: HYDE, Charles (Old Dominion University)

Presenter: HYDE, Charles (Old Dominion University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 207

Type: **not specified**

Recent PHENIX results probing gluon dynamics in proton-proton and highly asymmetric nuclear collisions at $\sqrt{s_{NN}} = 200$ and 510 GeV

Thursday, April 19, 2018 9:00 AM (24 minutes)

The dynamics of gluons in high energy proton and nuclei interactions remain an elusive process. Gluon interactions can be accessed via both light and heavy flavor hadron production at the PHENIX experiment at RHIC. In particular, via systematically measuring the nuclear modification in light hadron production in p+A and light-ion-A collisions at $\sqrt{s_{NN}} = 200$ GeV, we observed a distinct pattern emerging across large pseudorapidity ($-2 - 2$) and transverse momentum ranges (1 – 20 GeV/c), which can be used to constrain nuclear PDFs and models of parton energy loss in the cold nuclear matter. In addition, the heavy flavor (HF) quarks can be produced in nuclear collisions via various mechanisms that originate from gluons. Recently, the PHENIX collaboration carried out a systematic study of HF production cross sections in p+p collisions at $\sqrt{s} = 200$ GeV and 510 GeV via the production channels of non-prompt J/Ψ s, single and di-muons production at forward rapidities ($1.2 < y < 2.2$). These favor the upper limit of the HF cross section uncertainty band of the FONLL calculations. The recent PHENIX results on these measurements and their implications will be discussed in this talk.

Primary author: Dr HUANG, Jin (Brookhaven National Lab)

Presenter: Dr HUANG, Jin (Brookhaven National Lab)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 209

Type: **not specified**

Theoretical analysis of the double parton scattering in quarkonium production in proton-proton collision at LHC

Wednesday, April 18, 2018 10:10 AM (20 minutes)

The production process of quarkonia in proton-proton (pp) collision is a very good probe of the parton structure of the proton.

Recent experimental data of the production of J/ψ +vector boson or quarkonium pairs at the LHC and Tevatron suggest the relevance of double parton scattering (DPS).

In this talk, we will discuss the single parton scattering (SPS) contribution of the $J/\psi+Z$, $J/\psi+W$, and $J/\psi + J/\psi$ productions in hadron collision.

By revisiting the computation of the SPS contribution to $J/\psi + Z$ and $J/\psi + W$ production, we will demonstrate that the ATLAS data in fact show evidence for DPS.

Primary author: YAMANAKA, Nodoka (Riken)

Co-authors: LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS); SHAO, Hua-Sheng (Peking University, Beijing, China); ZHANG, Yu-Jie (Beihang University)

Presenter: YAMANAKA, Nodoka (Riken)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 210

Type: **not specified**

Impact of CMS 5.02 TeV dijet measurements on gluon PDFs

Wednesday, April 18, 2018 12:10 PM (20 minutes)

We discuss the implications of the (preliminary) CMS dijet data from 5.02 TeV pp and pPb collisions for gluon PDFs of the proton and nuclei. The preliminary pp data show a discrepancy with NLO predictions using CT14 and MMHT14 PDFs. We find that this difference cannot be accommodated with the associated scale uncertainties and debate the possible changes needed in the gluon PDFs. A similar discrepancy is found between the CMS pPb data and NLO predictions e.g. with EPPS16 nuclear modifications imposed on CT14 proton PDFs. When a nuclear modification ratio of the pp and pPb data is constructed, the uncertainties in the scale choices and in proton PDFs effectively cancel and a good agreement between the data and EPPS16 is found, except in some bins at backward rapidities corresponding to large x of the nucleus. To assess the impact of these data on EPPS16 nuclear PDFs, we use a non-quadratic extension of the Hessian reweighting method. A significant reduction in EPPS16 uncertainties is obtained with the fit supporting strong nuclear shadowing and valence-like antishadowing for gluons. We also indicate the possible changes needed in the EPPS16 parametrization at large x .

Primary authors: PAAKKINEN, Petja (University of Jyväskylä); ESKOLA, Kari J. (University of Jyväskylä); PAUKKUNEN, Hannu (University of Jyväskylä)

Presenter: PAAKKINEN, Petja (University of Jyväskylä)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 211

Type: **not specified**

Bottom quark effects on the ptZ spectrum and the W mass determination

Wednesday, April 18, 2018 2:30 PM (30 minutes)

We study lepton-pair production in association with bottom quarks at the LHC, and present the predictions obtained at next-to-leading order in QCD, both at fixed order and matched with a QCD parton shower, for several differential distributions. We discuss the estimate of the theoretical uncertainties and consider the dependence on the perturbative QCD scales (renormalisation, factorisation and shower), we compare different parton shower models and matching schemes. We focus on the inclusive lepton-pair transverse momentum distribution, and propose a simple procedure to accurately include bottom quark effects, beyond the standard massless approximation. We estimate how this alternative formulation may affect the tuning of QCD parton shower parameters and in turn we extrapolate its impact in the simulation of charged-current Drell-Yan observables and in the W boson mass determination.

Primary author: VICINI, Alessandro (Università degli Studi e INFN Milano (IT))

Presenter: VICINI, Alessandro (Università degli Studi e INFN Milano (IT))

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 212

Type: **not specified**

Recent QCD results from the xFitter project

Wednesday, April 18, 2018 4:30 PM (18 minutes)

We present the xFitter project which provides an open-source software framework for the determination of the proton's parton distribution functions and for the interpretation of the physics analyses in the context of Quantum Chromodynamics. The project has been used recently for a number of analyses performed by the LHC collaborations and theory community, which are summarised briefly. The xFitter developer's team also performed several studies in the last year including estimation of the impact of heavy quark matching scales, which are presented in more details.

Primary author: OLNESS, Fred (Southern Methodist University)

Co-authors: GLAZOV, Alexander (Deutsches Elektronen-Synchrotron (DE)); XFITTER DEVELOPERS TEAM

Presenter: OLNESS, Fred (Southern Methodist University)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 213

Type: **not specified**

Impact of low-x resummation on QCD analysis of HERA data

Thursday, April 19, 2018 10:00 AM (20 minutes)

Fits to the final combined HERA deep-inelastic scattering cross-section data within the conventional DGLAP framework of QCD have shown some tension at low x and low Q^2 . A resolution of this tension incorporating $\ln(1/x)$ -resummation terms into the HERAPDF fits is investigated using the xFitter program. The kinematic region where this resummation is important is delineated. Such high-energy resummation not only gives a better description of the data, particularly of the longitudinal structure function F_L , it also results in a gluon PDF which is steeply rising at low x for low scales, $Q^2 \lesssim 2.5 \text{ GeV}^2$, contrary to the fixed-order NLO and NNLO gluon PDF.

Primary authors: GLAZOV, Alexander (Deutsches Elektronen-Synchrotron (DE)); XFITTER DEVELOPERS' TEAM

Presenter: GLAZOV, Alexander (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 214

Type: **not specified**

Precision calculations for top-quark pair production at the LHC

Tuesday, April 17, 2018 2:20 PM (20 minutes)

In this work we will present predictions for top-quark pair differential distributions at the LHC13 at NNLO QCD accuracy and including EW corrections. For the latter we include not only contributions of $\mathcal{O}(\alpha_s^2\alpha)$, but also those of order $\mathcal{O}(\alpha_s\alpha^2)$ and $\mathcal{O}(\alpha^3)$. We will discuss the difference between the additive and multiplicative approach for the combination of QCD and EW corrections. Furthermore we will present results for the inclusive A_C as well as several differential asymmetries at the LHC8. The material presented will be based on the arXiv:1705.04105 and arXiv:1711.03945 papers.

Primary authors: CZAKON, Michal Wiktor (Rheinisch Westfaelische Tech. Hoch. (DE)); HEYMES, David (University of Cambridge); MITOV, Alexander (University of Cambridge (GB)); PAGANI, Davide (TUM - Garching bei München); TSINIKOS, Ioannis (UCLouvain); ZARO, Marco (Nikhef National institute for subatomic physics (NL))

Presenter: TSINIKOS, Ioannis (UCLouvain)

Session Classification: WG5: Physics with Heavy Flavours

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 215

Type: **not specified**

TOPSiDE: A detector concept for the EIC

Tuesday, April 17, 2018 12:24 PM (18 minutes)

We report on a detector concept, TOPSiDE, being developed for the EIC Electron-Ion Collider. TOPSiDE aims at the detection and identification of all particles created in electron-proton/ion collisions at the EIC while achieving the best possible momentum/energy resolution. The measurement of hadronic jets exploits the advantages offered by Particle Flow Algorithms (PFAs), which in turn require imaging calorimetry. Particle identification is achieved through time-of-flight measurements in the tracker and the electromagnetic calorimeter, necessitating the application of ultra-fast silicon sensors. In the forward (hadron) direction the particles are identified with a Cerenkov detector covering forward angles up to 10 degrees and a dipole or toroidal magnet for momentum measurement. The talk presents the detector concept, the status of its simulation software, first studies performed with a completed simulation tool chain, and the status of the detector R&D related to the novel and challenging aspects of the concept detector.

Primary authors: REPOND, Jose (Argonne National Laboratory); BLYTH, David (Argonne National Laboratory); ARMSTRONG, Whitney (Argonne National Laboratory); CHEKANOV, Sergei (Argonne National Laboratory); HATTAWY, Mohammad (Argonne National Laboratory); JOHNSTON, Sereres (Argonne National Laboratory); FREESE, Adam (Argonne National Laboratory); METCALFE, Jessica (Argonne National Laboratory); XIE, Junqi (Argonne National Laboratory)

Presenter: REPOND, Jose (Argonne National Laboratory)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 216

Type: **not specified**

Future of Nuclear PDFs

Wednesday, April 18, 2018 2:45 PM (25 minutes)

Parton densities PDFs are most important objects both from a fundamental point of view, for characterising the partonic content of hadrons and nuclei, and for the application of collinear factorisation in hadronic and nuclear collisions. Nuclear PDFs are greatly unknown, compared to those in the proton, due to the scarcity of experimental data. In this talk I will first review the present status of nuclear PDFs. Then I will discuss the perspectives of further determining them in presently existing experiments, particularly in pPb collisions at the LHC. Finally I will examine the possibilities that planned experiments, both hadronic machines - HL-LHC - and electron-nucleus colliders - EIC, LHeC and FCC-eh, offer for constraining nPDFs.

Primary author: ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Presenter: ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 217

Type: **not specified**

Probing BSM physics with electron-proton colliders

Thursday, April 19, 2018 9:00 AM (20 minutes)

When discussing the future searches for New Physics, electron-positron and proton-proton collider dominate the agenda, the choice being between a clean environment and higher energy. In this talk I will show with two concrete examples (Long-Lived Charged particles in SUSY and Higgs rare decays) how electron-proton colliders combine a clean environment with energies beyond the reach of most planned electron-positron colliders, thus providing an unique opportunity to probe Beyond Standard Model phenomena.

Primary author: ZURITA, José Francisco (KIT)

Co-authors: CURTIN, David (University of Maryland); DESHPANDE, Kaustubh (University of Maryland, College Park); FISCHER, Oliver (Unibas)

Presenter: ZURITA, José Francisco (KIT)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 218

Type: **not specified**

Transversity in inclusive DIS and novel TMD sum rules

Wednesday, April 18, 2018 2:00 PM (30 minutes)

A new collinear factorization analysis of inclusive DIS scattering with suitable non-perturbative “jet correlators” shows that a novel, non-perturbative spin-flip term associated with the invariant mass of the produced hadrons couples to the target’s transversity distribution function. In inclusive cross sections, this provides an hitherto neglected and large contribution to the twist-3 part of the g_2 structure function, that can explain the discrepancy between recent calculations and fits of this quantity. It also provides an extension of the Burkhardt-Cottingham sum rule, now featuring an interplay between the g_2 and h_1 functions that calls for a re-examination of their small- x behavior; likewise it provides an extension of the Efremov-Teryaev-Leader sum rule, suggesting a novel way to measure the tensor charge of the proton. As part of the calculation leading to these results, but interesting in their own right, novel TMD sum rules are derived.

Primary author: ACCARDI, Alberto (Hampton U. and Jefferson Lab)

Presenter: ACCARDI, Alberto (Hampton U. and Jefferson Lab)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 219

Type: **not specified**

Probing gluon TMDs with quarkonia

Tuesday, April 17, 2018 11:30 AM (25 minutes)

In this talk, I will discuss the relevance of using quarkonium-hadroproduction data in order to study the gluon TMDs in unpolarised protons. I will discuss the case of single η_c production as well as that of $J/\psi(\Upsilon) + \gamma$ and J/ψ pairs. In particular, I will discuss our first extraction of f_1^g using the di- J/ψ LHCb data and argue that $h_1^{\perp g}$ can be extracted in the near future with data taken in the CMS and ATLAS acceptances. I will also discuss how the newly introduced matching procedure based on an inverse-error weighting can help connect such studies with computations made in the collinear factorisation.

Primary authors: Dr PISANO, Cristian (University of Pavia); LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS); KASEMETS, Tomas (JGU Mainz); Dr G. ECHEVARRÍA, Miguel (INFN Pavia); SCARPA, Florent (IPN Orsay - Paris-Sud U. - CNRS/IN2P3); SIGNORI, Andrea (VU University Amsterdam - Nikhef); SCHLEGEL, Marc (New Mexico State University)

Presenter: LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 220

Type: **not specified**

W, Z and top production measurements at LHCb

Tuesday, April 17, 2018 11:50 AM (20 minutes)

Albeit initially designed for b-physics, LHCb has demonstrated to function very well as a general-purpose forward detector, covering the pseudo-rapidity range $2 < \eta < 5$.

Several measurements concerning the production of W, Z and top have been performed using LHCb data. A selection of relevant results will be presented, highlighting LHCb's new measurement of tt production at $\sqrt{s}=13$ TeV.

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); ROBBE, Patrick (Université Paris-Saclay (FR))

Presenter: ROBBE, Patrick (Université Paris-Saclay (FR))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 221

Type: **not specified**

Resummation of transverse observables in hadronic collisions

Wednesday, April 18, 2018 2:00 PM (30 minutes)

I will present a method for the computation of logarithmically enhanced terms at all orders for observables featuring kinematic cancellations away from the Sudakov limit. I will describe the approach in the context of observables of interest at colliders, and comment on extensions to more general cases.

Primary authors: BIZON, Wojciech Jozef; TORRIELLI, Paolo; RE, Emanuele (CERN); ROTTOLI, Luca (University of Oxford); MONNI, Pier Francesco (CERN)

Presenter: MONNI, Pier Francesco (CERN)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 222

Type: **not specified**

K⁻ over K⁺ multiplicity ratio for kaons produced in DIS with a large fraction of the virtual-photon energy

Thursday, April 19, 2018 12:00 PM (20 minutes)

The K^- over K^+ multiplicity ratio is measured in deep-inelastic scattering, for the first time for kaons carrying a large fraction z of the virtual-photon energy. The data were obtained by the COMPASS collaboration using a 160 GeV muon beam and an isoscalar ${}^6\text{LiD}$ target. The regime of deep-inelastic scattering is ensured by requiring $Q^2 > 1 (\text{GeV}/c)^2$ for the photon virtuality and $W > 5 \text{ GeV}/c^2$ for the invariant mass of the produced hadronic system. Kaons are identified in the momentum range from 12 GeV/ c to 40 GeV/ c , thereby restricting the range in Bjorken- x to $0.01 < x < 0.40$. The z -dependence of the multiplicity ratio is studied for $z > 0.75$. For very large values of z , i.e. $z > 0.8$, the results contradict expectations obtained using the formalism of (next-to-)leading order perturbative quantum chromodynamics. This may imply that cross-section factorisation or/and universality of (kaon) fragmentation functions do not hold. Our studies suggest that within this formalism an additional correction may be required, which takes into account the phase space available for hadronisation.

Primary author: NUNES, Ana Sofia (LIP-Lisbon)

Presenter: NUNES, Ana Sofia (LIP-Lisbon)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 223

Type: **not specified**

Deep inelastic scattering in the dipole picture at next-to-leading order

Tuesday, April 17, 2018 9:24 AM (24 minutes)

We study quantitatively [1] the importance of the recently derived NLO corrections [2,3,4] to the DIS structure functions at small x in the dipole formalism. We show that these corrections can be significant and depend on the factorization scheme used to resum large logarithms of energy into renormalization group evolution with the BK equation. This feature is similar to what has recently been observed for single inclusive forward hadron production [5,6]. Using a factorization scheme consistent with the one recently proposed for the single inclusive cross section, we show that it is possible to obtain meaningful results for the DIS cross sections. We also discuss ongoing work to combine these NLO DIS structure functions in the improved factorization scheme with the resummed/NLO BK evolution equation in order to do consistent NLO accuracy comparisons with HERA data.

- [1] B. Ducloué, H. Hänninen, T. Lappi, Y. Zhu, Phys.Rev. D96 (2017) no.9, 094017
- [2] G. Beuf, Phys.Rev. D94 (2016) no.5, 054016
- [3] G. Beuf, Phys.Rev. D96 (2017) no.7, 074033
- [4] H. Hänninen, T. Lappi, R. Paatelainen, arXiv:1711.08207 [hep-ph]
- [5] E. Iancu, A.H. Mueller, D.N. Triantafyllopoulos, JHEP 1612 (2016) 041
- [6] B. Ducloué, T. Lappi, Y. Zhu, Phys.Rev. D95 (2017) no.11, 114007

Primary author: HÄNNINEN, Henri (University of Jyväskylä)

Presenter: HÄNNINEN, Henri (University of Jyväskylä)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 224

Type: **not specified**

Nuclear medium studies using DIS experiments with CLAS/CLAS12 at JLab, present and future

Wednesday, April 18, 2018 5:42 PM (18 minutes)

Jefferson lab's (JLab) CEBAF (now upgraded CEBAF12) accelerator's fixed target experiments give an unique opportunity to study a wide range of phenomena in nuclear medium using Deep Inelastic Scattering (DIS) measurements. Particularly CLAS Eg2 experiment, where different types of nuclei were exposed to electron beam, have provided important information for nuclear hadronization, hadronic and nuclear correlations, hadronic structure functions studies. These studies are fundamental for better understanding of the confinement in the nuclear medium and the essentials of nuclear structure. Apart of showing the results from already existing data, future plans will be discussed also, particularly already approved a new experiment with upgraded CLAS12, and future experiments in EIC (Electron Ion Collider).

Primary author: Prof. HAKOBYAN, Hayk (UTFSM)

Presenter: Prof. HAKOBYAN, Hayk (UTFSM)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 225

Type: **not specified**

First extraction of transversity from electron-proton and proton-proton data

Wednesday, April 18, 2018 10:10 AM (25 minutes)

We present the first extraction of the transversity distribution in the framework of collinear factorization based on the global analysis of pion-pair production in deep-inelastic scattering off transversely polarized targets and in proton-proton collisions with one transversely polarized proton. The extraction relies on the knowledge of dihadron fragmentation functions, which are taken from the analysis of electron-positron annihilation data. For the first time, the chiral-odd transversity is extracted from a global analysis similar to what is usually done for the chiral-even spin averaged and helicity distributions. The knowledge of transversity is important for detecting possible signals of new physics in high-precision low-energy experiments.

Primary author: RADICI, Marco

Presenter: RADICI, Marco

Session Classification: WG1-WG6 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 226

Type: **not specified**

TeV-PeV neutrino-nucleon cross section measurement with 5 years' IceCube data

Tuesday, April 17, 2018 10:20 AM (20 minutes)

IceCube is a 1 cubic kilometer size neutrino detector located at the South Pole. It is capable of detecting all-sky neutrinos of all flavors from GeV to EeV energies. After detector completion, it discovered and measured the flux of extraterrestrial neutrinos in the TeV - PeV energy range, alongside with flux of neutrinos of known atmospheric origin. In this talk we will present a novel analysis method and the preliminary result of the neutrino-nucleon Deep Inelastic Scattering (DIS) cross section measurement as a function of neutrino energy in the TeV –10 PeV energy range utilizing neutrino absorption by the Earth.

We analyzed five years of data collected with complete IceCube detector from May 2011 to May 2016. This analysis focuses on electromagnetic and hadronic showers (cascades) mostly induced by electron and tau neutrinos. The applied event selection features high background rejection (<10% background contamination below 60TeV, background free above 60TeV) in rejecting atmospheric muons and high signal efficiency (~80%). The final neutrino sample consists of about 5600 events, with about 420 events above 10TeV reconstructed energy. An unfolding method was applied to enable the mapping from reconstructed cascade parameters such as neutrino energy and zenith to true neutrino variables. The analysis was performed assuming isotropic astrophysical neutrino flux, in in seven energy bins, and in two zenith bins (“down-going” from the south-hemisphere and “up-going” from the north-hemisphere). The ratio of down-going events and up-going events (absorbed by the Earth at large energies) is sensitive to the neutrino-nucleon DIS cross section and is insensitive to the dominant neutrino flux uncertainties.

The neutrino-nucleon DIS cross section preliminary result will be compared with the Standard Model theoretical calculation.

Primary authors: XU, Yiqian (Stony Brook University); ICECUBE COLLABORATION

Presenter: XU, Yiqian (Stony Brook University)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 227

Type: **not specified**

QCD analysis of the ATLAS and CMS W and Z cross-section measurements and implications for the strange sea density

Tuesday, April 17, 2018 3:20 PM (20 minutes)

In the present paper, the ATLAS inclusive W^\pm and Z boson production data are analysed together with the CMS inclusive W^\pm and Z boson production data to investigate any possible tensions between the data sets and to determine the strange sea fraction, within the framework of a parton distribution function fit at next-to next-to leading order in perturbative QCD.

Primary authors: Prof. COOPER-SARKAR, Amanda (Oxford); WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Presenter: WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 228

Type: **not specified**

[Cancelled] Bottom and Charm Mass determinations from global fits to QQ bound states at N3LO

The bottomonium spectrum up to $n = 3$ is studied within Non-Relativistic Quantum Chromodynamics up to N3LO. We consider finite charm quark mass effects both in the QCD potential and the MS-pole mass relation up to third order in the Upsilon-scheme counting. The $u = 1/2$ renormalon of the static potential is canceled by expressing the bottom quark pole mass in terms of the MSR mass. A careful investigation of scale variation reveals that, while $n = 1, 2$ states are well behaved within perturbation theory, $n = 3$ bound states are no longer reliable. We carry out our analysis in the $n_l = 3$ and $n_l = 4$ schemes and conclude that, as long as finite m_C effects are smoothly incorporated in the MSR mass definition, the difference between the two schemes is rather small. Performing a fit to b - \bar{b} bound states we find $m_b(m_b) = 4.216 \pm 0.039$ GeV. We extend our analysis to the lowest lying charmonium states finding $m_c(m_c) = 1.273 \pm 0.054$ GeV. Finally, we perform simultaneous fits for m_b and α_S finding $\alpha_S(m_Z) = 0.1178 \pm 0.0051$. Additionally, using a modified version of the MSR mass with lighter massive quarks we are able to predict the uncalculated $O(\alpha_S^4)$ virtual massive quark corrections to the relation between the MS-bar and pole masses.

Primary authors: Dr MATEU BARREDA, Vicent (University of Salamanca); Dr GARCIA ORTEGA, Pablo (University of Salamanca)

Presenter: Dr MATEU BARREDA, Vicent (University of Salamanca)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 229

Type: **not specified**

[Cancelled] Single production of extra quarks with large width at the Large Hadron Collider

This paper explores the effects of both finite width and interference (with background) in the single production and decay of extra heavy quarks with charge $+2/3$ and $-1/3$ at the Large Hadron Collider (LHC). This dynamics is normally ignored in standard experimental searches and we assess herein the regions of validity of current approaches, using a model independent parametrization. We also evaluate the performances of an experimental analysis at 13 TeV for the determination of the excluded regions in the (M_Q, Γ_Q) plane, M_Q being the mass of the VLQ and Γ_Q its width.

Primary authors: PRAGER, Hugo (University of Southampton); Dr PANIZZI, Luca (Universita' di Genova & INFN (Italy)); MORETTI, Stefano (STFC-Rutherford Appleton Laboratory (GB)); O'BRIEN, dermot (University of Southampton)

Presenter: PRAGER, Hugo (University of Southampton)

Session Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Track Classification: WG3: Higgs and BSM Physics in Hadron Collisions

Contribution ID: 230

Type: **not specified**

MC tuning using the HHT PDF set with the low-x higher-twist term.

Tuesday, April 17, 2018 9:40 AM (20 minutes)

In the HHT QCD fit the standard DGLAP evolution was augmented by including an additional low-x higher-twist term in the description of the longitudinal structure function, F_L . This additional term significantly improves the description of the HERA reduced cross sections at low Bjorken-x and low four-momentum-transfer squared, Q^2 . Since the HHT fit describes well data from the highest Q^2 down to Q^2 of a few GeV^2 , it can be used in studies to tune MC samples using the LHC underlying event variables. Preliminary results of this tuning will be shown in this presentation.

Primary authors: Prof. COOPER-SARKAR, Amanda (Oxford); ABT, Iris (MPI); FOSTER, Brian (University of Oxford (GB)); Dr MYRONENKO, Volodymyr (Deutsches Elektronen-Synchrotron); GUNNELLINI, Paolo (Deutsches Elektronen-Synchrotron (DE)); WING, Matthew (University College London); WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Presenter: WICHMANN, Katarzyna (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 231

Type: **not specified**

Physics at the Compact Linear Collider (CLIC)

Thursday, April 19, 2018 11:40 AM (20 minutes)

The Compact Linear Collider (CLIC) is a proposed high-luminosity linear electron-positron collider operated at energies from the top pair production threshold up to 3 TeV. With its high luminosity and flexible collision energy CLIC offers a wide spectrum of possible physics research, from precision measurement of Standard Model parameters to searches for new particles and new physics phenomena. At the first stage CLIC will be operated at 350-380 GeV collision energy. At this stage the emphasis is on precision top quark physics, e.g. via a threshold scan around 350 GeV, and on model-independent determination of the Higgs boson couplings by applying the recoil mass technique to Higgs-strahlung events. At the higher energy stages (1500 and 3000 GeV) Higgs bosons will be produced in large numbers via the WW-fusion process. This allows to measure the Higgs boson properties with high precision and to search for rare Higgs decays. The sensitivity to anomalous top quark form-factors is also improved at high collision energies. CLIC operation at 3 TeV will allow to perform direct and indirect searches for supersymmetry and other phenomena of new physics models. New particles can be discovered in a model-independent way almost up to the kinematic limit of 1500 GeV, while indirect evidences can be sensitive to new physics at the scale of tens of TeVs.

In this talk we present an overview of the CLIC physics potential using physics benchmark studies. The results are based on the full detector simulations for signal and background processes.

Primary author: SOPICKI, Pawel

Presenter: SOPICKI, Pawel

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 233

Type: **not specified**

An analysis of fragmentation functions of charged hadrons including proton-(anti)proton data from the Tevatron and the LHC

Thursday, April 19, 2018 11:20 AM (20 minutes)

In this contribution I will present a determination of the Fragmentation Functions (FFs) of unidentified charged hadrons at next-to-leading order in quantum chromodynamics based on the NNPDF methodology. The analysis includes cross-section data for single-hadron production in electron-positron annihilation, from a variety of experiments, and in proton-(anti)proton collision from the Tevatron and the LHC. I will discuss the quality of the FFs determined in this analysis with particular emphasis on the impact of the proton-(anti)proton data on the gluon distribution.

Primary author: BERTONE, Valerio (NIKHEF)

Co-authors: Dr NOCERA, Emanuele Roberto (University of Oxford); HARTLAND, Nathan (VU Amsterdam); ROTTOLI, Luca (University of Oxford)

Presenter: BERTONE, Valerio (NIKHEF)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 235

Type: **not specified**

Simulations of photo-nuclear dijets with PYTHIA 8 and their sensitivity to nuclear PDFs

Tuesday, April 17, 2018 11:30 AM (25 minutes)

In ultra-peripheral heavy-ion collisions the ions encounter with such a large impact parameter that no strong interaction can take place. However, the photons produced by the colliding ion can interact either with the other nucleus or with a photon from the another nucleus. The former corresponds to photoproduction studied earlier in electron-proton collisions at HERA but with a nuclear target. This provides an unique opportunity to study the nuclear modifications of the PDFs with the photo-nuclear processes measured in lead-lead collisions at the LHC. First preliminary results for photo-nuclear dijets were recently published by ATLAS and plenty of more data are expected in near future. In this talk, I will first present our recent implementation of photoproduction processes in PYTHIA 8 general-purpose Monte-Carlo event generator. The resulting simulations are compared to charged-hadron and dijet production data from different HERA experiments and the theoretical uncertainties of the framework are quantified. Then I will discuss how the relevant part of the photon flux from heavy-ions is obtained using equivalent photon approximation and present predictions for photo-nuclear dijet cross section at the LHC. To estimate the potential of this data to further constrain the nuclear PDFs, the expected statistical uncertainty based on LHC luminosity is compared to uncertainties in current nuclear PDF analyses.

Primary author: Dr HELENIUS, Ilkka (Tübingen University)

Co-author: SJOSTRAND, Torbjorn

Presenter: Dr HELENIUS, Ilkka (Tübingen University)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 236

Type: **not specified**

Progress on CTEQ-TEA PDFs

Tuesday, April 17, 2018 2:40 PM (20 minutes)

We present the recent progress on parton distribution functions (PDF) of the proton from the CTEQ-TEA collaboration.

Primary authors: Dr YUAN, C.-P. (Michigan State University); Dr SCHMIDT, Carl (Michigan State University); Dr STUMP, Daniel (Michigan State University); Dr WINTER, Jan (Michigan State University); Dr HUSTON, Joey (Michigan State University); Dr PUMPLIN, Jon (Michigan State University); Dr GAO, Jun (Shanghai Jiao-Tong University); Mr XIE, Keping (Southern Methodist University); Dr GUZZI, Marco (University of Manchester); Dr NADOLSKY, Pavel (Southern Methodist University); Dr DULAT, Sayipjamal (Xinjiang University); Dr HOU, Tie-Jiun (Xinjiang University)

Presenter: Dr HOU, Tie-Jiun (Xinjiang University)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 237

Type: **not specified**

Visualizing sensitivity of hadronic experiments to the nucleon structure

Wednesday, April 18, 2018 5:24 PM (18 minutes)

Which hadronic experiments constrain the PDF dependence of the Higgs boson cross section? What constrains the strangeness PDF better: LHC vector boson production, (SI)DIS, or jet production? We present a new technique to quantitatively answer such questions without performing a full PDF fit or PDF reweighting. The technique employs the Hessian method and takes into account the (un)correlated experimental uncertainties and PDF-driven correlations. Using this technique, one easily visualizes the distribution of constraints on PDFs in the (x, Q) plane and can estimate the potential impact of future experiments without performing a fit.

Primary authors: DOYLE , Sean; GAO, Jun; HOBBS, Timothy; HOU, Tie-Jiun; NADOLSKY, Pavel; OLNESS, Fred; WANG, Bo-Ting

Presenter: OLNESS, Fred

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 238

Type: **not specified**

NNLO QCD predictions for dijet production in diffractive DIS

Tuesday, April 17, 2018 10:36 AM (24 minutes)

Calculations for dijet production in diffractive deep-inelastic scattering (DIS) at next-to-next-to-leading order accuracy (NNLO) are presented. The calculations are based on the antenna subtraction formalism and the hard coefficients are convoluted with currently available PDFs for diffractive scattering (DPDFs).

The NNLO predictions are compared to a large number of available measurements and different observables. Detailed studies on the DPDF and scale dependencies are presented.

Primary authors: HUSS, Alexander Yohei (CERN); BRITZGER, Daniel (Ruprecht Karls Universitaet Heidelberg (DE)); CURRIE, James; NIEHUES, Jan (University of Zurich); ZLEBICK, Radek (Deutsches Elektronen-Synchrotron (DE)); GEHRMANN, Thomas (Univ. Zurich)

Presenter: ZLEBICK, Radek (Deutsches Elektronen-Synchrotron (DE))

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 239

Type: **not specified**

Energy frontier DIS at CERN: the LHeC and the FCC-eh, PERLE

Wednesday, April 18, 2018 2:00 PM (45 minutes)

Energy-frontier DIS can be realised at CERN through an energy recovery linac that would produce 60 GeV electrons to collide with the HL-LHC or, eventually, with the HE-LHC or the FCC hadron beams. It would deliver lepton-proton/nucleus collisions with center of mass energies in the range 0.8-3.5 TeV per nucleon, and luminosities exceeding 10^{34} (5×10^{32}) $\text{cm}^{-2}\text{s}^{-1}$ in ep (ePb). Such machine would provide a huge physics program, with the highest resolution microscope for hadron structure, rich Higgs, top and precision EW physics, large possibilities for BSM searches, and a unique top-energy nuclear physics facility with eventual access to a new regime of QCD at high partonic densities. All these aspects have strong complementarities with the respective, concurrent pp and AA programs. In this talk we review the LHeC and FCC-eh proposals at CERN, with emphasis on the accelerator and infrastructure aspects. We also review the project of an ERL demonstrator, PERLE, under consideration to be built at LAL Orsay.

Co-authors: ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES)); ARDUINI, Gianluigi (CERN)

Presenter: ARDUINI, Gianluigi (CERN)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 240

Type: **not specified**

Progress on fast grid techniques for NNLO with APPLfast-NNLO

Wednesday, April 18, 2018 4:48 PM (18 minutes)

The fastNLO and APPLgrid projects provide a fast and flexible way to reproduce the results of perturbative QCD cross section calculations with any input parton distribution functions. The latest developments from these projects are presented with particular emphasis on the common APPLfast interface to the NNLOJET calculation for general cross section calculations at next-to-next-to-leading order (NNLO). The most recent results on the reproduction of the NNLO coefficients for different physics processes are presented. A mechanism for the general distribution of grids produced at NLO and NNLO by different groups is also discussed.

Primary authors: HUSS, Alexander; GWENLAN, Claire (University of Oxford (GB)); BRITZGER, Daniel (Deutsches Elektronen-Synchrotron (DE)); RABBERTZ, Klaus (KIT - Karlsruhe Institute of Technology (DE)); SUTTON, Mark (University of Sussex (GB))

Presenter: GWENLAN, Claire (University of Oxford (GB))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 241

Type: **not specified**

Universal fit of parton distributions and fragmentation functions

Thursday, April 19, 2018 10:20 AM (20 minutes)

We report a new QCD global analysis with a simultaneous extraction of polarized and unpolarized parton densities and fragmentation functions from the available polarized and unpolarized DIS, SIDIS and SIA data sets

Primary author: SATO, nobuo (jlab)

Presenter: SATO, nobuo (jlab)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 242

Type: **not specified**

Bayesian perspective on QCD global analysis

Wednesday, April 18, 2018 5:06 PM (18 minutes)

In this talk, we present a dedicated analysis of existing Monte Carlo methods in global QCD analysis. We critically examine the interpretability of uncertainties on extracted quantities, such as parton densities or fragmentation functions against nested sampling and more traditional approaches using Hessian methodology. We discuss how in some cases the inclusion of resampling, partition, and cross-validation of data sets can artificially inflate uncertainties on the fitted distributions.

Primary author: SATO, nobuo (jlab)

Presenter: SATO, nobuo (jlab)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 243

Type: **not specified**

Semi-inclusive Kaon production at low scales

Wednesday, April 18, 2018 5:40 PM (20 minutes)

In perturbative QCD, the masses of the hadrons involved in high energy reactions can usually be neglected. In this talk, I will discuss one case in which this may not be a good approximation, namely production of Kaons in electron-proton collisions at low (and not so low) beam energies. In particular, I will present a recent proposal to include hadron masses in theoretical calculations, and how these Hadron Mass Corrections can explain a large discrepancy observed in measurements performed at the HERMES and COMPASS experiments. I will also discuss some preliminary spectator model calculations designed, in particular, to test the range of validity of the approximations needed in the proposed factorization scheme

Primary author: GUERRERO, Juan (Hampton University/Jefferson Lab)

Co-author: ACCARDI, Alberto (Hampton U. and Jefferson Lab)

Presenter: GUERRERO, Juan (Hampton University/Jefferson Lab)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 244

Type: **not specified**

[Cancelled] Quenching of Hadron Spectra in Heavy Ion Collisions at the LHC

The p_{\perp} dependence of the nuclear modification factor R_{AA} measured in PbPb collisions at the LHC exhibits a universal shape, which can be very well reproduced in a simple energy loss model based on the Baier-Dokshitzer-Mueller-Peigné-Schiff medium-induced gluon spectrum. The scaling is observed for various hadron species (h^{\pm} , D , J/ψ) in different centrality classes and at both colliding energies, $\sqrt{s} = 2.76$ and $\sqrt{s} = 5.02$ TeV. Results indicate a 10%–20% increase of the transport coefficient from $\sqrt{s} = 2.76$ to $\sqrt{s} = 5.02$ TeV, consistent with that of particle multiplicity. Based on this model, a data-driven procedure is suggested, which allows for the determination of the first and second moments of the quenching weight without any prior knowledge of the latter.

Based on Phys.Rev.Lett. 119 (2017) no.6, 062302

Primary author: ARLEO, Francois (Laboratoire Leprince-Ringuet)

Presenter: ARLEO, Francois (Laboratoire Leprince-Ringuet)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 245

Type: **not specified**

ePump, the Error PDF Updating Method Package

Wednesday, April 18, 2018 5:42 PM (18 minutes)

The LHC is bringing us lots of very precise measurements. The calculation of the corresponding theoretical prediction with the same precision is very time consuming in general. It is then a very challenge work to study the impact on Parton Distribution Functions(PDFs) from the precision measurements efficiently. We propose to boost the procedure by using ePump, the Error PDF Updating Method Package, a set of classes, functions, etc. for analyzing the impact of new data on the PDF predictions and uncertainties, in the Hessian method.

Primary authors: Dr YUAN, C.-P. (Michigan State University); Dr SCHMIDT, Carl (Michigan State University); Dr PUMPLIN, Jon (Michigan State University); Dr DULAT, Sayipjamal (Xinjiang University); Dr HOU, Tie-Jiun (Xinjiang University)

Presenter: Dr HOU, Tie-Jiun (Xinjiang University)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 246

Type: **not specified**

Exploring gluon saturation with photons in high energy hadron-hadron collisions

Thursday, April 19, 2018 10:12 AM (24 minutes)

We report on a recent computation of the NLO inclusive photon cross section using the Color Glass Condensate framework at the RHIC and LHC energies. Our result is appropriate for collisions where a dilute projectile (proton) hits a dense target (a proton or a heavy ion). We will briefly elucidate the main analytic NLO formula obtained in [1], while the main focus of this contribution are the first numerical results of the inclusive isolated photon cross section up to NLO [2] and its comparison to the available experimental data. Our main findings are summarized as:

- (i) We demonstrate the kinematic region where the NLO contribution completely dominates over the LO valence quark bremsstrahlung [3].
- (ii) We find that our results compare well with the available $p + p \rightarrow \gamma + X$ LHC data at 2.76 TeV and 7 TeV.
- (iii) We make predictions for the upcoming LHC data at 13 TeV.

[1] S. Benic, K. Fukushima, O. Garcia-Montero and R. Venugopalan, JHEP 1701, 115 (2017).

[2] S. Benic, K. Fukushima, O. Garcia-Montero and R. Venugopalan, in preparation.

[3] F. Gelis, J. Jalilian-Marian, Phys. Rev. D 66, 014021 (2002).

Primary authors: BENIC, Sanjin; FUKUSHIMA, Kenji (The University of Tokyo); GARCIA MONTERO, Oscar (Karl-Ruprechts-Universität Heidelberg); VENUGOPALAN, Raju (Brookhaven National Laboratory)

Presenter: BENIC, Sanjin

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 247

Type: **not specified**

Study of tau neutrino production property with measuring open-Charms at 400 GeV proton beam dump

Thursday, April 19, 2018 10:15 AM (20 minutes)

The property of tau neutrino is not well known, due to difficulty of its production and detection. The comparison of the neutrino-nucleon cross-section of tau neutrinos and other neutrino flavours is one of the interesting topics.

The tau neutrino cross-section has been measured by the DONUT experiment, but with a large statistical error of $\sim 30\%$ and a systematical uncertainty of $\sim 50\%$.

The statistics of detected tau neutrinos will be improved by a planned experiment such as SHiP experiment at CERN in near future.

The DsTau collaboration aims to reduce the systematic uncertainty to 10% by measuring the mother particles(Ds mesons) of tau neutrinos at the beam source.

Ds mesons are generated by proton interactions with the beam dump target, which decay in sequence $D_s \rightarrow \tau + \nu_\tau$ and $\tau \rightarrow \nu_\tau + X$.

DsTau will collect 1000 $D_s \rightarrow \tau$ associated events in 2×10^8 proton interactions with the tungsten target using the 400 GeV/c proton beam at CERN SPS.

The rate and xf distribution of the Ds production will be measured and the reduction of uncertainty on the tau neutrinos production will be achieved as the result.

Since Ds and tau mass difference is small, the kink angle($\sim 7mrad$) in the Ds to tau trajectory within a short distance of a few mm decay flight is difficult to detect.

Emulsion Cloud Chambers, ECCs, dedicated structure with tungsten plates and nuclear emulsion plates are used to detect small angle kinks at Ds to tau decays.

Since large number, 10^5 events, of associated charm production will be accumulated and analyzed in ECCs, physics of open-charm could be studied as a byproduct.

In this talk, the DsTau project introduction and results from small scale test exposure in 2016, 2017 will be shown.

Primary author: SATO, Osamu (Nagoya University (JP))

Presenter: SATO, Osamu (Nagoya University (JP))

Session Classification: WG4-WG5 Joint Session

Track Classification: WG5: Physics with Heavy Flavours

Contribution ID: 248

Type: **not specified**

Electroweak physics at FCC-eh and LHeC

Thursday, April 19, 2018 9:24 AM (24 minutes)

The potential of the future electron-proton collider facilities LHeC and FCC-eh for electroweak (EW) physics is studied using simulated neutral-current and charged-current DIS cross section data.

These measurements will allow for high precision determinations of the parameters of the EW theory, such as the weak boson masses and the couplings of the light quarks to the Z boson. The potential for precision measurements of the ρ and κ parameters, which are parameters particularly sensitive to additional contributions beyond the Standard Model formalism, are explored.

Primary authors: BRITZGER, Daniel (Ruprecht Karls Universitaet Heidelberg (DE)); KLEIN, Max

Presenter: KLEIN, Max

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 249

Type: **not specified**

The photon in the MMHT PDFs

Thursday, April 19, 2018 9:20 AM (20 minutes)

We describe the inclusion of the photon as an additional component of the proton in the MMHT framework. The input for the photon is based very directly on the recent LUX determination. We describe the similarities and differences above the input scale and the contribution from both leading twist and higher twist contributions, and their uncertainties. We study the impact on the other PDFs and the fit quality, for both the proton and neutron PDFs, and the implications for LHC physics.

Primary authors: THORNE, Robert Samuel (University College London (UK)); Dr HARLAND-LANG, Lucian (University of Oxford); Mr NATHVANI, Ricky (University College London)

Presenter: Mr NATHVANI, Ricky (University College London)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 250

Type: **not specified**

Update of MMHT PDFs

Tuesday, April 17, 2018 2:20 PM (20 minutes)

We discuss the most recent updates to the PDFs obtained in the MMHT framework. We study of the impact of the most recent LHC data and in particular focus on issues in finding good fits to these data given the very high precision now available and the implications for PDFs and their uncertainties.

Primary authors: THORNE, Robert Samuel (University College London (UK)); HARLAND-LANG, Lucian (University of Oxford); MARTIN, Alan

Presenter: THORNE, Robert Samuel (University College London (UK))

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 251

Type: **not specified**

Illuminating the photon content of the proton within a global PDF analysis

Thursday, April 19, 2018 9:00 AM (20 minutes)

Precision phenomenology at the LHC requires accounting for both higher-order QCD and electroweak corrections as well as for photon-initiated subprocesses. Building upon the recent NNPDF3.1 fit, in this work the photon content of the proton is determined within a global analysis supplemented by the LUXqed constraint relating the photon PDF to lepton-proton scattering structure functions: NNPDF3.1luxQED. The uncertainties on the resulting photon PDF are at the level of a few percent, with photons carrying up to 0.5% of the proton's momentum. We study the phenomenological implications of NNPDF3.1luxQED at the LHC for Drell-Yan, vector boson pair, top quark pair, and Higgs plus vector boson production. We find that photon-initiated contributions can be significant for many processes, leading to corrections of up to 20%. Our results represent a state-of-the-art determination of the partonic structure of the proton including its photon component.

Primary author: HARTLAND, Nathan (NIKHEF)

Presenter: HARTLAND, Nathan (NIKHEF)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 252

Type: **not specified**

NNPDF3.1: Parton distributions from high-precision collider data

Tuesday, April 17, 2018 3:00 PM (20 minutes)

We present a new set of parton distributions, NNPDF3.1, which updates NNPDF3.0, the first global set of PDFs determined using a methodology validated by a closure test. The update is motivated by recent progress in methodology and available data, and involves both. On the methodological side, we now parametrize and determine the charm PDF alongside the light quarks and gluon ones, thereby increasing from seven to eight the number of independent PDFs. On the data side, we now include the D0 electron and muon W asymmetries from the final Tevatron dataset, the complete LHCb measurements of W and Z production in the forward region at 7 and 8 TeV, and new ATLAS and CMS measurements of inclusive jet and electroweak boson production. We also include for the first time top-quark pair differential distributions and the transverse momentum of the Z bosons from ATLAS and CMS. We investigate the impact of parametrizing charm and provide evidence that the accuracy and stability of the PDFs are thereby improved. We study the impact of the new data by producing a variety of determinations based on reduced datasets. We find that both improvements have a significant impact on the PDFs, with some substantial reductions in uncertainties, but with the new PDFs generally in agreement with the previous set at the one sigma level. The most significant changes are seen in the light-quark flavor separation, and in increased precision in the determination of the gluon. We explore the implications of NNPDF3.1 for LHC phenomenology at Run II, compare with recent LHC measurements at 13 TeV, provide updated predictions for Higgs production cross-sections and discuss the strangeness and charm content of the proton in light of our improved dataset and methodology. The NNPDF3.1 PDFs are delivered for the first time both as Hessian sets, and as optimized Monte Carlo sets with a compressed number of replicas.

Primary author: HARTLAND, Nathan (NIKHEF)

Presenter: HARTLAND, Nathan (NIKHEF)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 253

Type: **not specified**

[Cancelled] Dijet production at the LHC after applying a short-range rapidity constraint

We study azimuthal ratios in Mueller-Navalet jets after imposing a rapidity veto constraint. In particular, we restrict the minijet radiation activity by not allowing subsequent emissions to be closer in rapidity than some fixed value b , the value of the rapidity veto. Previous studies in the literature suggest that for the NLL BFKL Green's function a rapidity veto with a value of two units of rapidity is enough to sample the part of phase space that corresponds to collinear emissions for asymptotic c.o.m. energies. In this work, we investigate the optimal values of b for fitting different azimuthal ratios at the LHC colliding energies and we discuss phenomenological and more formal aspects of our approach.

Primary authors: Dr CAPORALE, Francesco (IFT UAM-CSIC, Madrid); CELIBERTO, Francesco Giovanni (Università della Calabria and INFN Cosenza (Italy)); Dr CHACHAMIS, Grigorios (IFT UAM-CSIC, Madrid); GORDO, David (IFT UAM-CSIC); Prof. SABIO VERA, Agustin (Universidad Autonoma de Madrid (ES))

Presenter: Dr CHACHAMIS, Grigorios (IFT UAM-CSIC, Madrid)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 255

Type: **not specified**

The future DIS program in Jefferson Lab's Halls A and C

Wednesday, April 18, 2018 4:54 PM (24 minutes)

The recently completed 12 GeV upgrade of Jefferson Lab's Continuous Electron Beam Accelerator Facility (CEBAF) has established a unique worldwide capability for the precision study of a variety of inclusive, semi-inclusive, and exclusive reactions in deep inelastic electron-nucleon and electron-nucleus scattering. The near-doubling of CEBAF's maximum electron beam energy to 11 GeV (for electron scattering experiments) will enable the mapping of novel multidimensional aspects of nucleon and nuclear structure in the valence region, such as Transverse Momentum Dependent Parton Distributions (TMDs) and Generalized Parton Distributions (GPDs), with unprecedented precision. An exciting program of experiments is planned in experimental Halls A, B, and C, exploiting recent advances in high-luminosity polarized target technology, as well as new and upgraded detection apparatus, to take maximal advantage of the upgraded CEBAF beam. In this talk, I will present an overview of expected results of interest to the DIS community from planned experiments of the 11 GeV era in JLab's Halls A and C.

Primary author: PUCKETT, Andrew (University of Connecticut)

Presenter: PUCKETT, Andrew (University of Connecticut)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 256

Type: **not specified**

Small-x Contributions of the Quark and Gluon Helicity to the Proton Spin

Thursday, April 19, 2018 11:20 AM (30 minutes)

The contribution of the quark and gluon helicity distributions to the proton spin requires integrating these helicity PDFs over the entire range of x . This necessarily involves an extrapolation of the measured PDFs at finite values of x into their small- x asymptotics. As is well-known in the case of the unpolarized quark and gluon distributions, the small- x asymptotics are governed by evolution equations, leading to a determination of the intercept: the exponent of the power-law behavior of the PDFs at small x . In this talk, I will present the derivation and solution of the corresponding small- x evolution equations for the quark and gluon helicity PDFs. Because the transfer of spin to small x is a sub-eikonal effect, the small- x evolution equations for helicity are significantly different from the unpolarized ones. The helicity evolution equations I will present resum double logarithms of $1/x$, and they are sensitive to the detailed transverse structure of the polarized quark / gluon splitting kernels. The solution of these equations yields a leading-log evaluation of the quark and gluon helicity intercepts, which predict an enhancement of the helicity PDFs in the small- x tails. Preliminary estimates suggest that the enhancement of the proton spin contribution from polarized quarks may be significant, but is much milder for gluons.

Primary authors: Prof. KOVCHegov, Yuri; Dr PITONYAK, Daniel (Penn State University - Berks); SIEVERT, Matthew (Los Alamos National Laboratory)

Presenter: SIEVERT, Matthew (Los Alamos National Laboratory)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 257

Type: **not specified**

TOP Production at the LHeC and FCC-he

Thursday, April 19, 2018 9:48 AM (24 minutes)

In this talk we present an overview of top physics at two possible future electron-proton (ep) colliders at the high energy frontier, the LHeC and the FCC-eh. Selected topics include but are not limited to top structure function, top parton distribution functions, top spin polarization, top electric charge, measurement of V_{tb} , anomalous $t\bar{t}g$, $t\bar{t}Z$, $t\bar{t}W$, tqg , tqH couplings and CP phase of $t\bar{t}H$ coupling.

Direct Measurement of V_{td} and V_{ts} through electron proton collisions by Hao Sun:

We perform a study on the direct measurement of V_{td} and V_{ts} CKM matrix elements, at the electron proton colliders, through W boson and bottom quark associated production channel as well as W boson and jet associated production channel. The W and bottom(jet) final states can be produced by s -channel single top decay or t -channel top exchange. We find even at the current LHC based ep collider, the channels we are using, already result in very good limits, thus good direct measurement potentials to the V_{td} and V_{ts} CKM matrix elements.

Primary authors: Dr BEHNKE, Olaf (DESY); Prof. SCHWANENBERGER, Christian (DESY); Dr SUN, Hao (Dalian University)

Presenter: Dr SUN, Hao (Dalian University)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 258

Type: **not specified**

Recent Spin Structure Function Measurements from CLAS at Jefferson Laboratory

Wednesday, April 18, 2018 9:00 AM (25 minutes)

The polarized electron accelerator at Jefferson Laboratory (JLab) in Newport News, Virginia, USA yields a robust program for the study of the spin physics of the nucleon. The CLAS detector and longitudinally polarized target in Hall-B at JLab were employed in multiple measurements of spin-structure functions for the proton and neutron in the resonance and DIS regions at beam energies of up to 6 GeV. Recently published results from the EG1 experiment present extensive measurements of the g_1 and g_2 structure functions for the proton over a wide kinematic range ($0.05 < Q^2 < 5 \text{ GeV}^2$ and $1.08 < W < 3 \text{ GeV}$). These data, together with data from the related EG4 and EG1-DVCS experiments in Hall-B, help constrain global models of structure functions, virtual photon asymmetries, and parton helicity distributions, and provide more precise values of higher-twist matrix elements in the framework of the Operator Product Expansion.

Primary author: Dr FERSCH, Robert (Christopher Newport University)

Presenter: Dr FERSCH, Robert (Christopher Newport University)

Session Classification: WG1-WG6 Joint Session

Contribution ID: 259

Type: **not specified**

PDFs and α_s Measurements

Wednesday, April 18, 2018 3:10 PM (25 minutes)

Prospects for high precision determination of PDFs and α_s are presented, including results from HL-LHC, FCC, LHeC and EIC.

Primary author: GWENLAN, Claire (University of Oxford (GB))

Presenter: GWENLAN, Claire (University of Oxford (GB))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 260

Type: **not specified**

Heavy flavor production and large-x nuclear gluons at EIC

Wednesday, April 18, 2018 10:42 AM (18 minutes)

Heavy flavor production in DIS (open charm, beauty) provides a direct probe of the gluon density in the target. It can be used to determine the unknown nuclear modifications of the gluon density at large x (EMC effect, antishadowing), which reveal the fundamental QCD substructure of nucleon interactions in the nucleus. We report about a study of open charm production in nuclear DIS at a future EIC. This includes (a) the charm production rates and kinematic distributions at large x ; (b) charm reconstruction with exclusive D-meson decays and/or inclusive modes, enabled by the PID and vertex detection capabilities of EIC; (c) the impact of charm data on nuclear gluons; (d) possible extensions to other channels (photoproduction, beauty, jets). We present results of simulations of charm reconstruction obtained with a schematic model of the EIC detector (tracking, vertexing) and outline the performance requirements. The simulation tools developed for this purpose can be used for other EIC studies.

Primary authors: HYDE, Charles (Old Dominion University); FURLETOVA, Yulia (Jefferson Lab); WEISS, Christian (Jefferson Lab)

Presenter: FURLETOVA, Yulia (Jefferson Lab)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 261

Type: **not specified**

Next-generation neutron structure measurements with spectator tagging at EIC

Wednesday, April 18, 2018 10:24 AM (18 minutes)

DIS on the deuteron with detection of a proton in the nuclear fragmentation region ("spectator tagging") represents a unique method for extracting the neutron structure functions and their spin dependence. The measured proton recoil momentum (\sim few 100 MeV in the deuteron rest frame) controls the nuclear configuration during the DIS process and allows one to eliminate nuclear binding effects by extrapolating to the on-shell point (free neutron). Such measurements could be performed at a future Electron-Ion Collider (EIC) with suitable forward detectors. We report about recent progress in the theory and simulation of neutron structure measurements with spectator tagging at EIC. This includes (a) development of a theoretical model of nuclear final-state interactions in spectator tagging at intermediate x ($\sim 0.1-0.5$), caused by the exposure of the spectator nucleon to slow hadrons produced in the DIS process on the active nucleon [arXiv:1706.02244]; (b) calculation of the proton recoil momentum distribution, as determined by initial-state deuteron structure (S and D-waves) and final-state interactions; (c) simulations of recoil momentum measurements and neutron structure extraction at EIC under realistic conditions (beam momentum spread, resolution of forward detectors).

Primary authors: HYDE, Charles (Old Dominion University); STRIKMAN, Mark; WEISS, Christian (Jefferson Lab)

Presenter: HYDE, Charles (Old Dominion University)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 262

Type: **not specified**

Studies of 3D PDFs with CLAS12

Tuesday, April 17, 2018 2:30 PM (30 minutes)

The quark-gluon dynamics manifests itself in a set of non-perturbative functions describing all possible spin-spin and spin-orbit correlations. The Transverse Momentum Dependent parton distributions (TMDs) and Generalized Parton Distributions (GPDs) carry information not only on the longitudinal but also on the transverse momentum and position of partons, providing rich and direct information on the orbital motion of quarks. Studies of the 3D PDFs are currently driving the upgrades of several existing facilities (JLab, COMPASS and RHIC), and the design and construction of new facilities worldwide (EIC, FAIR, and JPARC).

Although the interest in GPDs and TMD PDFs has grown enormously, we are still in need of fresh theoretical and phenomenological ideas.

The main remaining challenges are extractions of actual 3D PDFs from different spin and azimuthal angle dependent distributions in a reliable and model independent way. In this talk, we present an overview of current status and future measurements of the 3D structure of the nucleon using exclusive and semi-inclusive production of photons and hadrons with the CLAS12 detector at Jefferson Lab.

Primary authors: KIM, Andrey (University of Connecticut); COLLABORATION, CLAS

Presenter: KIM, Andrey (University of Connecticut)

Session Classification: WG6-WG7 Joint Session

Track Classification: WG6: Spin and 3D structure

Contribution ID: 263

Type: **not specified**

BSM physics at the LHeC and the FCC-eh

Thursday, April 19, 2018 10:36 AM (24 minutes)

The LHeC and the FCC-eh at CERN are projected machines that will deliver ep collisions with center-of-mass energies in the TeV range and luminosities of order $10^{34} \text{ cm}^{-2}\text{s}^{-1}$. In this talk, new results will be presented on prospects for BSM searches in both machines.

Primary authors: ZURITA, José Francisco (KIT); AZUELOS, Georges (Universite de Montreal (CA)); D'ONOFRIO, Monica (University of Liverpool (GB)); FISCHER, Oliver (Unibas)

Presenter: ZURITA, José Francisco (KIT)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 264

Type: **not specified**

Higgs physics at the LHeC and the FCC-eh

Thursday, April 19, 2018 10:12 AM (24 minutes)

The LHeC and the FCC-eh at CERN are projected machines that will deliver ep collisions with center-of-mass energies in the TeV range and luminosities of order $10^{34} \text{ cm}^{-2}\text{s}^{-1}$. In this talk, new results will be presented on future precision Higgs SM properties in these machines, as well as new prospects for searches for exotic Higgs related phenomena in ep collisions at high energies.

Co-authors: KLEIN, Uta (University of Liverpool (GB)); ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Presenter: KLEIN, Uta (University of Liverpool (GB))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 265

Type: **not specified**

Small-x physics and diffraction at the LHeC and the FCC-eh

Wednesday, April 18, 2018 3:35 PM (25 minutes)

The LHeC and the FCC-eh at CERN are projected machines that will deliver ep (ePb) collisions with center-of-mass energies in the TeV range and luminosities of order 10^{34} (5×10^{32}) $\text{cm}^{-2}\text{s}^{-1}$. In this talk the possibilities for small-x physics and diffraction will be reviewed, with emphasis on recent results on the extraction of diffractive parton densities.

Co-authors: NEWMAN, Paul Richard (University of Birmingham (GB)); ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Presenter: NEWMAN, Paul Richard (University of Birmingham (GB))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 266

Type: **not specified**

Measurements of Nucleon Structure via Proton-Induced Drell-Yan Process at FNAL SeaQuest

Wednesday, April 18, 2018 12:30 PM (20 minutes)

SeaQuest at FNAL is a fixed-target experiment to measure the Drell-Yan process in $p+p$ and $p+A$, using the 120-GeV proton beam and targets of liquid hydrogen, liquid deuterium, carbon, iron and tungsten. During the course of operations, completed in July 2017, it recorded data from 1.4×10^{18} protons on the various targets.

SeaQuest aims at precisely measuring the flavor asymmetry of light-antiquark distributions ($\bar{d}(x)/\bar{u}(x)$) at large x in the nucleon. It also measures the angular distribution of the Drell-Yan process in $p+p$ and $p+d$ in order to investigate the Lam-Tung relation and further the Boer-Mulders distribution function. It also utilizes the Drell-Yan process in $p+A$ for measuring nuclear effects, including the nuclear dependence of sea quark distributions and the partonic energy loss in cold nuclear matter.

In this talk, the latest updates on the measurements and their impact on understanding of nuclear and hadronic structure will be presented.

Primary author: Dr NAGAI, Kei (Academia Sinica)

Presenter: Dr NAGAI, Kei (Academia Sinica)

Session Classification: WG1: Structure Functions and Parton Densities

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 267

Type: **not specified**

Measurement of longitudinal and transverse target polarization dependent azimuthal asymmetries in muon-p SIDIS processes at COMPASS

Tuesday, April 17, 2018 9:30 AM (20 minutes)

COMPASS is a fixed target experiment located at the M2 beamline of the SPS accelerator at CERN. One of the most important objectives of the experiment is the study of the spin structure of the nucleon. Within the QCD parton model approach, the quark structure of the nucleon spin can be parametrized in terms of quark transverse momentum dependent (TMD) parton distribution functions (PDFs) while the hadronization mechanism is described by Fragmentation Functions (FFs). In the experiment, specific convolutions of the TMD PDFs and FFs can be accessed through the measurement of longitudinal and transverse nucleon-spin-dependent azimuthal asymmetries of charged hadrons produced in semi-inclusive deep inelastic lepton-nucleon scattering (SIDIS) processes. Between 2002 and 2011 COMPASS has performed a series of dedicated data-takings using 160-200 GeV/c polarized muons scattering off longitudinally or transversely polarized deuteron (${}^6\text{LiD}$) and proton (NH_3) targets. The whole set of target spin-dependent azimuthal asymmetries present in the SIDIS cross-section has been extracted.

In this talk recent COMPASS results obtained for proton spin-dependent azimuthal asymmetries will be presented along with former results obtained by other collaborations and relevant theoretical model predictions.

Primary author: Dr PARSAMYAN, Bakur (University of Turin and INFN (IT))

Presenter: Dr PARSAMYAN, Bakur (University of Turin and INFN (IT))

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 268

Type: **not specified**

VHEeP: A very high energy electron–proton collider

Tuesday, April 17, 2018 9:40 AM (30 minutes)

Based on current CERN infrastructure, an electron–proton collider is proposed at a center-of-mass energy of about 9 TeV. A 7 TeV LHC bunch is used as the proton driver to create a plasma wakefield which then accelerates electrons to 3 TeV, these then colliding with the other 7 TeV LHC proton beam. Although of very high energy, the collider has a modest projected integrated luminosity of 10-100 inverse pb. For such a collider, with a center-of-mass energy 30 times greater than HERA, parton momentum fractions, x , down to about 10^{-8} are accessible for photon virtualities, Q^2 , of 1 GeV². The energy dependence of hadronic cross sections at high energies, such as the total photon-proton cross section, which has synergy with cosmic-ray physics, can be measured and QCD and the structure of matter better understood in a region where the effects are completely unknown. Searches at high Q^2 for physics beyond the Standard Model will be possible, in particular the significantly increased sensitivity to the production of leptoquarks.

Primary authors: CALDWELL, Allen Christopher (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)); WING, Matthew (University College London)

Presenter: CALDWELL, Allen Christopher (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 269

Type: **not specified**

Nucleon Tomography

Thursday, April 19, 2018 9:30 AM (30 minutes)

Generalized parton distributions embody information on both the longitudinal momentum of the quarks as well as their transverse position and thus allow determining a 3-dimensional image of the nucleon. For transversely polarized quarks and or nucleons, the resulting transverse deformation of these images provides new insight on nucleon spin structure and spin-orbit correlations. Twist-3 GPDs provide additional information on the dependence of transverse forces on the impact parameter.

Primary author: Prof. BURKARDT, Matthias (New Mexico State University)

Presenter: Prof. BURKARDT, Matthias (New Mexico State University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 270

Type: **not specified**

Suppression of gluon polarization in angular asymmetries

Tuesday, April 17, 2018 10:10 AM (20 minutes)

First we perform a phenomenological analysis of the $\cos 2\phi$ azimuthal asymmetry in virtual photon plus jet production induced by the linear polarization of gluons in unpolarized pA collisions. Employing a small-x model input distribution, the asymmetry is found to be strongly suppressed under TMD evolution, but still remains sufficiently large to be measurable in the typical kinematical region accessible at RHIC or LHC at moderate photon virtuality, whereas it is expected to be negligible in Z/W-jet pair production at LHC. We also investigate the energy evolution of the dipole type T-odd gluon TMDs inside a transversely polarized hadron, which unify at small x. The preliminary results shows that these TMDs are also suppressed under TMD evolution.

Primary author: ZHOU, Yajin (Shandong University)

Co-authors: BOER, Daniel; MULDER, Piet (VU/Nikhef); ZHOU, jian (ShanDong University)

Presenter: ZHOU, Yajin (Shandong University)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 271

Type: **not specified**

Phenomenology with the PARTONS framework of GPD models built from Light Front Wave Functions

Thursday, April 19, 2018 10:40 AM (20 minutes)

Generalized Parton Distributions (GPDs) encode the correlations between longitudinal momentum and transverse position of partons inside hadrons and can give access to a picture of the nucleon structure in 2+1 dimensions. They have been studied theoretically and experimentally for almost two decades and a new experimental era is starting (at JLab and COMPASS currently, and in the future at an EIC) to extract them.

The difficulty is that only an indirect experimental access is so far possible, through different exclusive channels and various observables. Therefore, one has to take into account the many theoretical constraints to be able to produce accurate models and rely on their phenomenology. Two important constraints are called the polynomiality and positivity properties. We will show how to make use of both of them by first modeling low Fock states light-front wave-functions, which gives a GPD in the DGLAP region by a parton number conserved overlap, and then covariantly extending this GPD to the ERBL region.

This work will be illustrated on a constituent quark-like model for valence GPDs. We will show that this allows to produce a phenomenological output (on DVCS data for instance) from this kind of models, which was impossible before. We will demonstrate the unique versatility of the PARTONS framework to achieve this under various perturbative QCD assumptions.

Primary author: CHOUIKA, Nabil (CEA Saclay)

Presenter: CHOUIKA, Nabil (CEA Saclay)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 272

Type: **not specified**

Bose Enhancement in the dilute-dense limit

Thursday, April 19, 2018 10:36 AM (24 minutes)

The ridge structure in two-particle correlations produced in high multiplicity collisions at the LHC have been examined in the Color Glass Condensate formalism. In this formalism it was found that in the dilute-dilute nucleus limit, corresponding to glasma graphs, the ridge structure was due to the Bose enhancement associated with two-gluon production, with a successful phenomenology developed on this basis. It was an open question whether or not Bose enhancement existed beyond this leading limit. Using the full dilute-dense result for two-gluon correlations we identify the contributions that survive the higher order saturation corrections in the target. We do find a Bose enhanced component of the correlation function when the two produced gluons have either equal transverse momentum or equal and opposite transverse momentum. Bose enhancement, in effect, produces a major contribution to the ridge structure in two-particle correlations.

Primary author: WERTEPNY, Douglas (Universidade de Santiago de Compostela)

Co-authors: ALTINOLUK, Tolga (National Centre for Nuclear Research); ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Presenter: WERTEPNY, Douglas (Universidade de Santiago de Compostela)

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 273

Type: **not specified**

A Fixed-Target Program at the LHC (AFTER@LHC): where do we stand ?

Tuesday, April 17, 2018 10:35 AM (25 minutes)

We review the physics opportunities [1] which are offered by a next generation and multi-purpose fixed-target experiment exploiting the LHC beams in order to study pp , pd and pA collisions at $\sqrt{s_{NN}} \sim 115$ GeV as well as $Pb p$ and PbA collisions at $\sqrt{s_{NN}} \sim 72$ GeV.

We propose two possible implementations, namely with an internal (polarised) gas target or with a “splitted” beam by a bent crystal which both provide typical instantaneous luminosities [1,2] for pp and pA collisions which surpass that of RHIC by more than 3 orders of magnitude and are comparable to those of the LHC collider mode.

We also discuss our most recent figures of merit [3,4,5] based on two already existing detector set-ups, the LHCb and the ALICE detectors.

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Primary author: LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

Presenter: LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 274

Type: **not specified**

Polarized positron beam perspectives for DIS studies

Wednesday, April 18, 2018 12:36 PM (24 minutes)

The recent PEPPo (Polarized Electrons for Polarized Positrons) experiment at the Thomas Jefferson National Accelerator Facility did open an easy and low-cost access to polarized positron beam through the efficient production of polarized positrons from the bremsstrahlung radiation of a MeV polarized electron beam. The application of this technique in the context of the upgraded CEBAF (Continuous Electron Beam Accelerator Facility) and the JLEIC (Jefferson Lab Electron Ion Collider) project allows us to investigate new features of deep inelastic and exclusive scatterings.

This presentation will discuss the current efforts of the Jefferson Lab Positron Working Group in the process of developing the physics case for a polarized positron beam at JLab 12 GeV and JLEIC.

Primary author: VOUTIER, Eric (CNRS/IN2P3/IPNO - Université Paris-Sud & Paris Saclay)

Presenter: VOUTIER, Eric (CNRS/IN2P3/IPNO - Université Paris-Sud & Paris Saclay)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 275

Type: **not specified**

The TMD Program at JLab

Tuesday, April 17, 2018 3:00 PM (30 minutes)

As a part of the general nucleon imaging effort, there have been many efforts to access the transverse momentum dependent parton distributions (TMDs) by using the semi-inclusive deep inelastic scatterings (SIDIS) processes. The recently upgraded Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Lab (JLab) provides golden opportunities to study them in valence quark region. The TMDs describe the three-dimensional, spin-correlated distributions of quarks and gluons in the nucleon in momentum space. The corresponding SIDIS measurements require high intensity and polarization with large kinematic coverage which will be provided by several different detectors. We will highlight some of the SIDIS results from the 6 GeV era and present an overview of the planned JLab TMD program in the 12 GeV era. This work is supported in part by U.S. Department of Energy under contract number DE-FG02-03ER41231.

Primary author: GAO, Haiyan (D)**Presenter:** GAO, Haiyan (D)**Session Classification:** WG6-WG7 Joint Session**Track Classification:** WG6: Spin and 3D structure

Contribution ID: 276

Type: **not specified**

eRHIC - an electron - Ion collider at BNL

Tuesday, April 17, 2018 11:30 AM (18 minutes)

In this talk I will summarize the current design status of eRHIC with special emphasis on the integration of the EIC Physics requirements into the accelerator design.

Primary author: ASCHENAUER, elke-caroline (BNL)

Presenter: ASCHENAUER, elke-caroline (BNL)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 277

Type: **not specified**

Polarisation measurements for hadron beams in colliders.

Wednesday, April 18, 2018 12:00 PM (18 minutes)

In this talk I will discuss the challenges to measure hadron polarization in high collision frequency and luminosity future electron ion colliders.

Primary author: ASCHENAUER, elke-caroline (BNL)

Presenter: ASCHENAUER, elke-caroline (BNL)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 278

Type: **not specified**

A Summary of the EIC Detector R&D Program

Wednesday, April 18, 2018 11:30 AM (30 minutes)

The Electron-Ion Collider (EIC) is the next-generation U.S.-based facility to study Quantum Chromodynamics by probing the dynamics of gluons and sea quarks with comprehensive and systematic measurements of high precision. The experimental program of the EIC is, thus, diverse, covering a broad range of studies from mapping the spatial, momentum, spin, and flavor distributions of gluons and sea quarks in the nucleon to exploring gluon saturation and gluon distributions in nuclei. To carry out this program, the use of different combinations of both beam energy and particle species, wide center-of-mass energy range, measurements of various processes, such as inclusive and semi-inclusive deep-inelastic scattering as well as exclusive elastic and inelastic scattering, and detection of various leptons, mesons, and baryons in the final state, is necessary. The broad experimental scope places challenging and unique requirements on detector capabilities. To name a few, excellent particle identification (PID) over a wide momentum range and full acceptance are a must. The objective of the current generic EIC Detector R&D Program is to develop detector concepts and technologies that are suitable to carry out the EIC scientific program and can operate in the EIC environment. In this talk we will present key aspects of the R&D program, such as calorimetry, PID, and tracking, and discuss the current status of advancing related detector technologies.

Primary author: ILIEVA, Yordanka (University of South Carolina)

Presenter: ILIEVA, Yordanka (University of South Carolina)

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 279

Type: **not specified**

Pion and Kaon Structure Functions at EIC

Tuesday, April 17, 2018 10:10 AM (25 minutes)

Pions and kaons are, along with protons and neutrons, the main building blocks of nuclear matter. The distribution of the fundamental constituents, the quarks and gluons, is expected to be different in pions, kaons, and nucleons. However, experimental data are sparse. As a result, there has been persistent doubt about the behavior of the pion's valence quark structure function at large Bjorken- x and virtually nothing is known about the contribution of gluons. The Electron-Ion Collider with an acceptance optimized for forward physics could provide access to structure functions over a larger kinematic region. This would allow for measurements testing if the origin of mass is encoded in the differences of gluons in pions, kaons, and nucleons, and measurements that could serve as a test of assumptions used in the extraction of structure functions. Measurements at an EIC would also allow to explore the effect of gluons at high x . In this talk we will discuss the prospects of such measurements.

Primary author: ENT, Rolf (Jefferson Lab)**Co-author:** Prof. HORN, Tanja (Catholic University of America)**Presenter:** ENT, Rolf (Jefferson Lab)**Session Classification:** WG7: Future of DIS**Track Classification:** WG7: Future of DIS

Contribution ID: 280

Type: **not specified**

$\gamma \rightarrow \rho^0$ impact factor in QCD: light-cone sum rule calculation

Wednesday, April 18, 2018 10:36 AM (24 minutes)

We discuss the $\gamma \rightarrow \rho^0$ impact factor, i.e., the transition amplitude of a photon to a neutral vector meson ρ^0 , where the transition is mediated by the two t-channel gluons. The impact factor is a building block in the QCD descriptions of high-energy exclusive processes like $\gamma p \rightarrow Vp$, and $\gamma\gamma \rightarrow VV$, with $V = \rho^0, \omega, \phi, \dots$. In the framework of QCD factorization, the impact factor is expressed as a convolution of the partonic amplitude, $\gamma g \rightarrow q\bar{q}g$, in perturbation theory and the quark-antiquark light-cone distribution amplitudes for the vector meson V . The corresponding factorization formula has been successfully derived for the case of the longitudinal polarization of V . For the transverse polarization of V , however, the corresponding formula is associated with the higher twist (twist-three) contributions and the factorization is known to break down due to infrared divergences which manifest themselves as endpoint singularities arising in the convolution integral. This fact indicates that the impact factor for the transversely polarized vector meson is dominated by the non-factorizable "soft" contributions. We study the $\gamma \rightarrow \rho^0$ impact factor constructing the light-cone QCD sum rules for the corresponding amplitudes, which allow us to estimate the relevant soft contributions in a largely model-independent way, with the use of dispersion relations and quark-hadron duality. We are able to obtain the finite result for the impact factor with the transversely polarized ρ^0 meson, ρ_T^0 , as well as for ρ_L^0 with the longitudinal polarization. We compare our results with the approach based on the vector meson dominance model associated with the pomeron exchange. As an application, we calculate the cross sections for $\rho^0\rho^0$ production in two-photon collisions, in particular, the cross sections for $\gamma\gamma \rightarrow \rho_L^0\rho_T^0$ with the different polarizations in the forward productions of the ρ^0 mesons, which may be measured in Belle II experiment.

Primary author: TANAKA, Kazuhiro

Presenter: TANAKA, Kazuhiro

Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Small-x and Diffraction

Contribution ID: 281

Type: **not specified**

Measurement of transverse-spin-dependent azimuthal asymmetries in Drell-Yan process at COMPASS

Tuesday, April 17, 2018 11:55 AM (20 minutes)

The first measurement of transverse-spin-dependent azimuthal asymmetries in the pion-induced Drell-Yan (DY) process will be presented, which was reported in PRL 119, 112002. We use the CERN SPS 190 GeV/c π^- beam and a transversely polarized ammonia target. Three azimuthal asymmetries giving access to different transverse-momentum-dependent (TMD) parton distribution functions (PDFs) are extracted using dimuon events with invariant mass between 4.3 GeV/c² and 8.5 GeV/c². Within the experimental uncertainties, the observed sign of the Sivers asymmetry is found to be consistent with the fundamental prediction of quantum chromodynamics (QCD) that the Sivers TMD PDFs extracted from DY have a sign opposite to the one extracted from semi-inclusive deep-inelastic scattering (SIDIS) data. We present two other asymmetries originating from the pion Boer-Mulders TMD PDFs convoluted with either the nucleon transversity or pretzelosity TMD PDFs. A recent COMPASS SIDIS measurement was obtained at a hard scale comparable to that of these DY results. This opens the way for possible tests of fundamental QCD universality predictions.

Primary author: Dr CHIOSSO, Michela (University of Torino and INFN)

Presenter: Dr CHIOSSO, Michela (University of Torino and INFN)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure

Contribution ID: 282

Type: **not specified**

COMPASS facility beyond 2020

Wednesday, April 18, 2018 4:30 PM (24 minutes)

COMPASS at CERN, a facility designed to perform research in the hadron partonic structure and hadron spectroscopy, is now planning its future beyond 2020. After a brief summary of achieved results the presentation will focus on the COMPASS programme, planned between CERN accelerator long shutdowns 2 and 3: measurements of SSA using the muon beam on a transversely polarised deuteron target and proton radius measurement in the elastic muon-proton scattering. A hint at the long-term programme, proposed after the shutdown 3, with conventional muon and hadron beams as well as nonconventional, RF separated kaon/antiproton beams will also be given.

Primary author: BADELEK, Barbara (University of Warsaw (PL))

Presenter: BADELEK, Barbara (University of Warsaw (PL))

Session Classification: WG7: Future of DIS

Track Classification: WG7: Future of DIS

Contribution ID: 284

Type: **not specified**

Towards the $N^3\text{LO}$ evolution of parton distributions

Thursday, April 19, 2018 9:40 AM (20 minutes)

We present a status report on calculations for the four-loop splitting functions in perturbative QCD, which will pave the way to future determination of $N^3\text{LO}$ parton distribution functions of hadrons. In the large- N_c limit, the exact four-loop contribution to the flavour non-singlet splitting functions has been obtained. For the remaining large- N_c suppressed terms, we provide approximate expressions that are sufficient for phenomenological applications. The status of the calculations in the flavour-singlet sector will be also briefly discussed.

Primary author: UEDA, Takahiro

Presenter: UEDA, Takahiro

Session Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 288

Type: **not specified**

[thru #248] Electroweak physics at FCC-eh and LHeC

The potential of the future electron-proton collider facilities LHeC and FCC-eh for electroweak (EW) physics is studied using simulated neutral-current and charged-current DIS cross section data.

These measurements will allow for high precision determinations of the parameters of the EW theory, such as the weak boson masses and the couplings of the light quarks to the Z boson. The potential for precision measurements of the ρ and κ parameters, which are parameters particularly sensitive to additional contributions beyond the Standard Model formalism, are explored.

Co-authors: BRITZGER, Daniel (Ruprecht Karls Universitaet Heidelberg (DE)); KLEIN, Max

Presenters: BRITZGER, Daniel (Ruprecht Karls Universitaet Heidelberg (DE)); KLEIN, Max

Session Classification: WG7: Future of DIS

Contribution ID: 291

Type: **not specified**

[to be removed] WW production at NNLO+PS

Presenter: RE, Emanuele (CERN and LAPTh)

Session Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 292

Type: **not specified**

Extraction of Transverse Momentum Distributions from semi-inclusive DIS and Drell-Yan data.

Wednesday, April 18, 2018 10:35 AM (25 minutes)

We discuss the first attempt at a “global fit” of unpolarized Transverse Momentum Distributions, using data from semi-inclusive deep inelastic scattering and Drell-Yan processes. We describe the main features of this extraction, compare its outcome with new data, and discuss what further developments are needed.

Primary author: DELCARRO, Filippo (INFN - National Institute for Nuclear Physics)

Presenter: DELCARRO, Filippo (INFN - National Institute for Nuclear Physics)

Session Classification: WG1-WG6 Joint Session

Track Classification: WG1: Structure Functions and Parton Densities

Contribution ID: 331

Type: **not specified**

[to be removed] Exploring improvements to the fitting of the strong coupling constant through means of jet substructure techniques

Presenter: THEEUWES, Vincent (University of Goettingen)

Session Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 333

Type: **not specified**

Discussion for European Strategy Update for Particle Physics (ESUPP): Introduction

Tuesday, April 17, 2018 4:30 PM (10 minutes)

This panel discussion will be chaired and moderated by Aharon Levy.

For more detail, see <https://indico.cern.ch/event/656250/page/13094-discussion-for-a-document-for-european-strategy-update>

Primary author: LEVY, Aharon (Tel Aviv University (IL))

Presenter: LEVY, Aharon (Tel Aviv University (IL))

Session Classification: WG7: Future of DIS

Contribution ID: 334

Type: **not specified**

Contributions, comments, and questions from audience

Tuesday, April 17, 2018 5:40 PM (1h 20m)

More questions and discussions from the audience and remote participants.

Primary author: LEVY, Aharon (Tel Aviv University (IL))

Presenter: LEVY, Aharon (Tel Aviv University (IL))

Session Classification: WG7: Future of DIS

Contribution ID: 338

Type: **not specified**

The case for EIC

Tuesday, April 17, 2018 4:40 PM (10 minutes)

Primary author: SURROW, Bernd (Temple University)

Presenter: SURROW, Bernd (Temple University)

Session Classification: WG7: Future of DIS

Contribution ID: 339

Type: **not specified**

The case for LHeC

Tuesday, April 17, 2018 4:50 PM (10 minutes)

Co-author: KLEIN, Max

Presenter: KLEIN, Max

Session Classification: WG7: Future of DIS

Contribution ID: **340**

Type: **not specified**

The case for VHEp

Tuesday, April 17, 2018 5:00 PM (10 minutes)

Co-author: CALDWELL, Allen Christopher (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Presenter: CALDWELL, Allen Christopher (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

Session Classification: WG7: Future of DIS

Contribution ID: **341**

Type: **not specified**

The case for FCC

Tuesday, April 17, 2018 5:10 PM (10 minutes)

Co-author: D'ENTERRIA, David (CERN)

Presenter: D'ENTERRIA, David (CERN)

Session Classification: WG7: Future of DIS

Contribution ID: 342

Type: **not specified**

QCD theory addressed in the above facilities

Tuesday, April 17, 2018 5:20 PM (10 minutes)

Co-author: QIU, Jianwei (Jefferson Lab)

Presenter: QIU, Jianwei (Jefferson Lab)

Session Classification: WG7: Future of DIS

Contribution ID: 343

Type: **not specified**

Heavy Ion Theory addressed in the above facilities

Tuesday, April 17, 2018 5:30 PM (10 minutes)

Co-author: ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Presenter: ARMESTO PEREZ, Nestor (Universidade de Santiago de Compostela (ES))

Session Classification: WG7: Future of DIS

Contribution ID: 344

Type: **not specified**

Exploring improvements to the fitting of the strong coupling constant through means of jet substructure techniques

Tuesday, April 17, 2018 2:25 PM (25 minutes)

Over the years many different types of fits for the strong coupling constant have been performed. However one high precision result that currently significantly differs from the world average are results from event shapes at electron positron colliders. One possible source for the difference in these results could be the degeneracy between the fit of the strong coupling constant and non-perturbative parameter. In this talk I will explore the possibility to apply jet substructure techniques, specifically soft drop, in order to break the degeneracy between the non-perturbative parameter and the strong coupling constant.

Primary author: THEEUWES, Vincent (University of Goettingen)

Presenter: THEEUWES, Vincent (University of Goettingen)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 345

Type: **not specified**

WW production at NNLO+PS

Tuesday, April 17, 2018 9:25 AM (20 minutes)

We present predictions for diboson production (with exact decays) that are next-to-next-to-leading order (NNLO) accurate and consistently matched to a parton shower (NNLOPS). The matching is achieved by upgrading the NLO WW+j calculation with MiNLO, in such a way that NLO accuracy is guaranteed for W+W- inclusive observables and by then performing a reweighting of the WWJ-MiNLO events, differential in the W+W- Born variables, to the NNLO results obtained with Matrix.

Primary author: RE, Emanuele (CERN)

Presenter: RE, Emanuele (CERN)

Session Classification: WG4: Hadronic and Electroweak Observables

Track Classification: WG4: Hadronic and Electroweak Observables

Contribution ID: 347

Type: **not specified**

Orbital angular momentum distributions at small-x

Tuesday, April 17, 2018 12:35 PM (20 minutes)

We study the orbital angular momentum (OAM) of quarks and gluons in the nucleon in the small-x region. We argue, in two different ways, that the gluon OAM significantly cancels the gluon helicity distribution at small-x. A similar cancellation occurs also in the quark sector.

Primary author: HATTA, Yoshitaka (Japan/Yukawa Institute)

Presenter: HATTA, Yoshitaka (Japan/Yukawa Institute)

Session Classification: WG6: Spin and 3D structure

Track Classification: WG6: Spin and 3D structure