CTEQ Fall meeting 2024

2024 Fall CTEQ meeting @ CNU

Report of Contributions

Contribution ID: **27**   Type: **not specified**

Jets in DIS: Present and Future

Thursday 21 November 2024 10:00 (30 minutes)

I will provide an overview of recent jet measurements in DIS using data from the H1 experiment at HERA. Renewed interest, triggered by the upcoming EIC, has once again brought jet physics in DIS to the forefront of research. I will highlight how novel observables, algorithms, and theoretical frameworks developed in recent years have been tested against precise DIS data. Additionally, I will explore potential advancements that could arise from the EIC pathfinder program over the next decade. Finally, I will discuss future prospects at the EIC, where the next-generation of detector technology will enable a comprehensive jet physics program at the core scientific mission of the EIC.

Would you be interested in giving a 5-minutes flash talk?

Author: ARRATIA MUNOZ, Miguel

Presenter: ARRATIA MUNOZ, Miguel

Session Classification: Public Session

Contribution ID: **28**   Type: **not specified**

Towards a parton shower with next-to-leading order splitting functions

Thursday 21 November 2024 11:30 (30 minutes)

Parton shower event generators are based on approximations to what can be called a quantum parton shower evolution equation. The "quantum" designation indicates that the quantum nature of color and spin are incorporated. The splitting functions for this kind of shower evolution are currently known only to first order in the strong coupling. I will describe work to extend this to second order for the case of electron-positron annihilation.

Would you be interested in giving a 5-minutes flash talk?

No

Author: Prof. SOPER, Davison (University of Oregon)

Co-author: Dr NAGY, Zoltan (DESY)

Presenter: Prof. SOPER, Davison (University of Oregon)

Session Classification: Public Session

Contribution ID: **29**   Type: **not specified**

Automated studies of PDF parametrizations

Thursday 21 November 2024 09:30 (30 minutes)

We present a methodology to automate the generation of polynomial shapes for parton distribution functions (PDFs). Our recent studies demonstrate that the freedom in parametrization choice contributes a large part of PDF uncertainties. Using Bézier curves, we construct error bands for pion PDFs as a demonstration of a general approach that can be applied in other types of global analyses. Additionally, this methodology can be applied in both fitting and interpolation modes, enabling the inclusion of additional information, such as integral constraints, tailored to the specific characteristics of different PDFs or data of different nature.

Would you be interested in giving a 5-minutes flash talk?

No

Author: COURTOY, Aurore (Instituto de Física, UNAM)

Presenter: COURTOY, Aurore (Instituto de Física, UNAM)

Session Classification: Public Session

Contribution ID: **30**   Type: **not specified**

GMVFN scheme implementations with Subtraction and Residual PDFs for processes at hadron colliders

Thursday 21 November 2024 16:00 (30 minutes)

We discuss the application of ACOT-like general mass
variable flavor number (GMVFN) schemes to proton-proton collisions with particular attention
to the production of final states with at least one heavy quark. Subtraction and residual heavy-
quark parton distribution functions are introduced to facilitate the implementation of this scheme
at higher orders in perturbative QCD.

Would you be interested in giving a 5-minutes flash talk?

No

Author: GUZZI, Marco (Kennesaw State University)

Presenter: GUZZI, Marco (Kennesaw State University)

Session Classification: Public Session

Contribution ID: **31**   Type: **not specified**

Evidence for Modified Quark-Gluon Distributions in Nuclei by Correlated Nucleon Pairs

Thursday 21 November 2024 12:00 (20 minutes)

We extend the QCD Parton Model analysis using a factorized nuclear structure model incorporating individual nucleons and pairs of correlated nucleons. Our analysis of high-energy data from lepton Deep-Inelastic Scattering, Drell-Yan and W/Z production simultaneously extracts the universal effective distribution of quarks and gluons inside correlated nucleon pairs, and their nucleus-specific fractions. Such successful extraction of these universal distributions marks a significant advance in our understanding of nuclear structure properties connecting nucleon- and parton-level quantities.

Would you be interested in giving a 5-minutes flash talk?

Yes

Author: Prof. OLNESS, Fred (Southern Methodist University (US))

Presenter: Prof. OLNESS, Fred (Southern Methodist University (US))

Session Classification: Public Session

Contribution ID: **32**   Type: **not specified**

Uncertainty quantification with discrepant data sets

Friday 22 November 2024 11:20 (20 minutes)

I will discuss different models of uncertainty quantification when different data sets of a fit disagree and are discrepant. Specifically I will review three different models including the use of the Gaussian Mixture Model to determine uncertainties.

Would you be interested in giving a 5-minutes flash talk?

Yes

Author: MOHAN, Kirtimaan Ajaykant

Presenter: MOHAN, Kirtimaan Ajaykant

Session Classification: Public Session

Contribution ID: **33**   Type: **not specified**

Fast NNLO Implementation of the approximate ACOT scheme for DIS

Thursday 21 November 2024 16:30 (20 minutes)

Mass-dependent quark contributions are of great importance to DIS processes. The simplified-ACOT-χ scheme includes these effects over a wide range of momentum transfers up to next-to-leading order in QCD. In recent years an improvement in the case of neutral current DIS has been achieved by using zero-mass contributions up to next-to-next-to-leading order (NNLO) with massive phase-space constraints. In this talk, we extend this approach to the case of charged current DIS and provide an implementation in the open-source code APFEL++. The increased precision will be valuable for understanding current and future neutrino experiments, the Electron-Ion-Collider and the studies of partonic substructure of hadrons and nuclei. A highly efficient implementation using gridding techniques extends the applicability of the code to the determination of parton distribution functions (PDFs).

Would you be interested in giving a 5-minutes flash talk?

Yes

Author: RISSE, Peter

Presenter: RISSE, Peter

Session Classification: Public Session

Contribution ID: **34** · Type: **not specified**

Collins-Soper kernel from collinear factorization

Thursday 21 November 2024 14:50 (20 minutes)

Inclusive DIS at large Bjorken is revisited to highlight the importance of tracking off-lightcone effects in the proof of factorization theorems, even collinear ones. In DIS at threshold, in particular, the relevant physics develops around two opposite light-cone directions just like in TMD SIDIS, and the Collins Soper kernel emerges as a universal function in the rapidity evolution of the relevant correlators. The new factorization theorem thus offers a novel avenue for lattice calculations of the Collins-Soper kernel with collinear operators, and bridges different fields and communities.

Would you be interested in giving a 5-minutes flash talk?

No

Authors: ACCARDI, Alberto (Christopher Newport U. and Jefferson Lab); SIGNORI, Andrea (University of Turin and INFN); SIMONELLI, Andrea (ODU Research Foundation and JLAB); SILVA ROCHA COSTA, Caroline (Jefferson Lab); CERUTTI, Matteo (Christopher Newport University and Jefferson Lab)

Presenter: CERUTTI, Matteo (Christopher Newport University and Jefferson Lab)

Session Classification: Public Session

Contribution ID: **36**   Type: **not specified**

Impact of parity-violating deep-inelastic scattering on the nucleon strangeness and weak mixing angle

Friday 22 November 2024 09:20 (20 minutes)

At present, there is a lack of experimental data constraining the dependence of the strange nucleon parton distribution functions (PDFs) on the parton momentum fraction and the electroweak mixing angle at low-Q^2. The parity-violating asymmetry from the neutral-current deep inelastic scattering of electrons from proton and deuterium targets, which will be measured by the proposed SoLID experiment at Jefferson Lab, possesses a known sensitivity to both the strange PDFs and electroweak parameters. In this work we explore this sensitivity and perform a new global analysis, incorporating pseudo-data from simulations based on SoLID experimental projections with radiative corrections to the asymmetry, for the unpolarized PDFs and the weak-mixing angle. We find a sizable constraining power of future A_{PV} data on the high-x behavior of the nucleon strangeness and a substantial resolving power on the weak-mixing angle at low-Q^2.

Would you be interested in giving a 5-minutes flash talk?

Yes

Author: WHITEHILL, Richard

Presenter: WHITEHILL, Richard

Session Classification: Public Session

Contribution ID: **38**   Type: **not specified**

Extraction of Parton Structure including Lattice QCD

Thursday 21 November 2024 14:30 (20 minutes)

QCD is a difficult theory of hadrons because it is described entirely unobservable partons, the quarks and gluons. In order to access parton distributions, hadronic observables such as experimental cross sections or lattice QCD matrix elements must have factorization approximations separated hadronic and partonic distance scales. These observables are sensitive to different regimes in momentum fraction x. This complementarity could be beneficial in extractions of PDFs, TMDs, and GPDs. In this talk I will highlight a few specific cases where modern lattice QCD can have significant impact.

Would you be interested in giving a 5-minutes flash talk?

No

Author: Dr KARPIE, Joseph (JLab)

Presenter: Dr KARPIE, Joseph (JLab)

Session Classification: Public Session

Contribution ID: **43**　　　　　　　　　　　　　　　　　Type: **not specified**

News from the CTEQ-TEA global analysis

Thursday 21 November 2024 16:50 (20 minutes)

I summarize the recent progress on the global PDF analysis for protons and pions from the CTEQ-TEA group, with the main focus on the results published in arXiv:2408.04020.

Would you be interested in giving a 5-minutes flash talk?

No

Author: Prof. NADOLSKY, Pavel (Southern Methodist University/Michigan State University)

Presenter: Prof. NADOLSKY, Pavel (Southern Methodist University/Michigan State University)

Session Classification: Public Session

Contribution ID: 44   Type: **not specified**

Systematic uncertainties in PDF fits

Friday 22 November 2024 11:40 (30 minutes)

We will discuss some aspects of the interpretation of systematic uncertainties in global PDF analyses

Would you be interested in giving a 5-minutes flash talk?

No

Author: Prof. NADOLSKY, Pavel (Southern Methodist University/Michigan State University)

Co-author: COURTOY, Aurore (Instituto de Física, UNAM)

Presenter: Prof. NADOLSKY, Pavel (Southern Methodist University/Michigan State University)

Session Classification: Public Session

Contribution ID: 45　　　　　　　　　　　　　　　　Type: **not specified**

New Measurements of the Deuteron to Proton F2 Structure Function Ratio at Hall C, Jefferson Lab

Friday 22 November 2024 10:00 (20 minutes)

Nucleon structure functions, measured in lepton-nucleon scattering, are key to understanding partonic dynamics. At high parton momenta, extracting parton distributions becomes challenging due to non-perturbative effects and limited precision data. Neutron structure and d-quark distributions are particularly difficult to extract due to nuclear corrections required for deuteron-based measurements. Recent experiments at Jefferson Lab, including E12-10-002 in Hall C, have significantly reduced these uncertainties by improving deuteron-to-proton cross-section measurements at large Bjorken-x. These results enhance precision and provide valuable insights for refining global parton distribution function fits.

Would you be interested in giving a 5-minutes flash talk?

Author: BISWAS, Debaditya (Virginia Tech)

Presenter: BISWAS, Debaditya (Virginia Tech)

Session Classification: Public Session

Contribution ID: 46   Type: **not specified**

Welcome by Dr. Quentin Kidd, CNU Provost and Executive Vice President

Thursday 21 November 2024 09:00 (15 minutes)

Session Classification: Public Session

Contribution ID: 47   Type: **not specified**

QCD opportunities at JLab with 12 GeV positrons and 22 GeV Electrons

Thursday 21 November 2024 11:00 (30 minutes)

Presenter: KEPPEL, Cynthia (Thia)

Session Classification: Public Session

Contribution ID: **48**   Type: **not specified**

Discussion

Thursday 21 November 2024 12:20 (10 minutes)

Session Classification: Public Session

Contribution ID: 49   Type: **not specified**

Alpha strong determination with JLab experimental data

Thursday 21 November 2024 14:00 (30 minutes)

Presenter: DEUR, Alexandre (Jefferson Lab)

Session Classification: Public Session

Contribution ID: **50**　　　　　　　　　　　　　　　　　Type: **not specified**

Discussion

Thursday 21 November 2024 15:10 (20 minutes)

Session Classification: Public Session

Contribution ID: **51**   Type: **not specified**

Discussion

Thursday 21 November 2024 17:10 (20 minutes)

Session Classification: Public Session

Contribution ID: **52** Type: **not specified**

PVDIS investigations with SoLID detector

Friday 22 November 2024 09:00 (20 minutes)

Presenter: NYCZ, Michael (University of Virginia)

Session Classification: Public Session

Contribution ID: **53**
Type: **not specified**

Pixelization of partonic functions in JAM framework

Presenter: ZACCHEDDU, Marco (Jefferson Lab)

Session Classification: Public Session

Contribution ID: **54**　　　　　　　　　　　　　　　Type: **not specified**

Discussion

Friday 22 November 2024 10:20 (10 minutes)

Session Classification: Public Session

Contribution ID: **55**

Type: **not specified**

Systematic uncertainties from the implementation of higher twists in QCD analyses

Friday 22 November 2024 11:00 (20 minutes)

Presenter: PARK, Sanghwa (Jefferson Lab)

Session Classification: Public Session

Contribution ID: **56**　　　　　　　　　　　　　　　　　Type: **not specified**

Discussion

Friday 22 November 2024 12:10 (20 minutes)

Session Classification: Public Session

Contribution ID: **57**
Type: **not specified**

Workshop overview

Thursday 21 November 2024 09:15 (15 minutes)

Presenter: ACCARDI, Alberto (Christopher Newport U. and Jefferson Lab)

Session Classification: Public Session

Contribution ID: **58**   Type: **not specified**

Pixelizing Quantum-Correlation Functions: A Novel Approach for Hadron Structure Studies

Friday 22 November 2024 09:40 (20 minutes)

In this talk, we introduce a new approach for parameterizing Quantum-Correlation Functions (QCFs). By treating QCFs as multidimensional images or tensors, we propose a pixel-based representation. This novel perspective offers a versatile framework for analyzing and manipulating QCFs, enabling us to leverage a wide range of image processing techniques.

We will demonstrate the effectiveness of our new approach by applying it to extract Generalized Parton Distributios from Compton Form Factors. We will present initial results, showcasing its potential to enhance our understanding of hadron structure. Additionally, we will discuss the benefits of this method, such as its flexibility, and computational efficiency. By treating QCFs as images, we unlock new possibilities for research and analysis in hadron physics.

Would you be interested in giving a 5-minutes flash talk?

Yes

Author: ZACCHEDDU, Marco (Jefferson Lab)

Presenter: ZACCHEDDU, Marco (Jefferson Lab)

Session Classification: Public Session