Keping Xie

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Education and training

- **Research Associate**, 09/2023 – present
  Department of Physics and Astronomy, Michigan State University, East Lansing, MI 48825
  Supervisors: Kirtimaan Mohan and C.-P. Yuan
- **Postdoctoral Associate**, 09/2019 – 08/2023
  Pittsburgh Particle Physics, Astrophysics, and Cosmology Center (PITT PACC),
  Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260
  Supervisors: Ayres Freitas and Tao Han
- **Ph.D. in Physics**, 08/2014 – 08/2019
  Department of Physics, Southern Methodist University, Dallas, TX 75275-0181
  Advisors: Pavel Nadolsky and Roberto Vega
  Thesis: Massive elementary particles in the Standard Model and its supersymmetric triplet Higgs extension [link]
- **B.S. in Physics**, 09/2010 – 07/2014
  School of Physics, Peking University, Beijing 100871, China
  Advisor: Han-Qing Zheng

Research interests

I work on the high-energy phenomenology, which bridges the theoretical and experimental particle physics. My efforts mainly focus on the precision and resummation calculations. As a member of the CTEQ-TEA (CT) collaboration, I participate in the development of a new generation of QCD parton distribution functions (PDFs), CT18, and the corresponding QED corrections (CT18QED), which are widely used for physics exploration at the hadron colliders. Recently, I dedicate to the electroweak (EW) factorization, which involves the EW gauge bosons as well as Higgs bosons as partons to resum large logarithms as PDFs for initial-state radiations and fragmentation functions (FFs) for final-state radiations. Another focus of my research is heavy-flavor physics, which requires a general-mass composite scheme to match the high energy regime, where the heavy-flavor particle can be excited as an active massless parton, to the low energy region, in which heavy flavors can be only dynamically created through light flavors. I am also interested in perturbative high-order calculations, small-x and q_T resummations, Higgs bosons beyond the Standard Model, and effective field theory.

Publications

The latest list of my publications, including citations, can be viewed in the data bases of INSPIRE HEP, Google Scholar, and Sematic Scholar.

Peer-reviewed journals

[1] X. Jing *et al.*, "Quantifying the interplay of experimental constraints in analyses of parton distributions," *Phys. Rev. D* **108** no. 3, (2023) 034029, arXiv:2306.03918 [hep-ph].

[2] **CTEQ-TEA** Collaboration, I. Sitiwaldi, K. Xie, A. Ablat, S. Dulat, T.-J. Hou, and C.-P. Yuan, "Precision studies of the post-CT18 LHC Drell-Yan data in the CTEQ-TEA global analysis" *Phys. Rev. D* **108** no. 3, (2023) 034030, arXiv:2305.10733 [hep-ph].

[3] C. Accettura *et al.*, "Towards a Muon Collider", arXiv:2303.08533 [physics.acc-ph] (accepted by EPJC).

[4] M. Guzzi, T. J. Hobbs, K. Xie, J. Huston, P. Nadolsky, and C.-P. Yuan, "The persistent nonperturbative charm enigma," *Phys. Lett. B* **843** (2023) 137975, arXiv:2211.01387 [hep-ph].

[5] B. Batell, T. Ghosh, T. Han, and K. Xie, "Heavy Neutral Leptons at the Electron-Ion Collider," *JHEP* **03** (2023) 020 arXiv:2210.09287 [hep-ph].

[6] A. Courtoy, J. Huston, P. Nadolsky, K. Xie, M. Yan, and C.-P. Yuan, "Parton distributions need representative sampling," *Phys. Rev. D* **107** no. 3, (2023) 034008, arXiv:2205.10444 [hep-ph].

[7] J. Gao, D. Liu, and K. Xie, "Understanding PDF uncertainty on the W boson mass measurements in CT18 global analysis," *Chin.Phys.C* **46** (2022) 12, 123110, arXiv:2205.03942 [hep-ph].

[8] S. Amoroso *et al.*, "Snowmass 2021 whitepaper: Proton structure at the precision frontier," *Acta Phys. Polon. B* **53** no. 12, (2022) A1, arXiv:2203.13923 [hep-ph].

[9] **PDF4LHC Working Group** Collaboration, R. D. Ball *et al.*, "The PDF4LHC21 combination of global PDF fits for the LHC Run III," *J. Phys. G* **49** no. 8, (2022) 080501, arXiv:2203.05506 [hep-ph].

[10] J. L. Feng *et al.*, "The Forward Physics Facility at the High-Luminosity LHC," *J. Phys. G* **50** no. 3 (2023) 030501, arXiv:2203.05090 [hep-ex].

[11] L. A. Anchordoqui *et al.*, "The Forward Physics Facility: Sites, experiments, and physics potential," *Phys. Rept.* **968** (2022) 1–50, arXiv:2109.10905 [hep-ph].

[12] T. Han, W. Kilian, N. Kreher, Y. Ma, J. Reuter, T. Striegl, and K. Xie, "Precision test of the muon-Higgs coupling at a high-energy muon collider," *JHEP* **12** (2021) 162, arXiv:2108.05362 [hep-ph].

[13] **CTEQ-TEA** Collaboration, K. Xie, T. J. Hobbs, T.-J. Hou, C. Schmidt, M. Yan, and C. P. Yuan, "Photon PDF within the CT18 global analysis," *Phys. Rev. D* **105** no. 5, (2022) 054006, arXiv:2106.10299 [hep-ph].

[14] D. Buarque Franzosi *et al.*, "Vector boson scattering processes: Status and prospects," *Rev. Phys.* **8** (2022) 100071, arXiv:2106.01393 [hep-ph].

[15] T. Han, Y. Ma, and K. Xie, "Quark and gluon contents of a lepton at high energies," *JHEP* **02** (2022) 154, arXiv:2103.09844 [hep-ph].

[16] T. Han, Y. Ma, and K. Xie, "High energy leptonic collisions and electroweak parton distribution functions," *Phys. Rev. D* **103** no. 3, (2021) L031301, arXiv:2007.14300 [hep-ph].

[17] T.-J. Hou *et al.*, "New CTEQ global analysis of quantum chromodynamics with high-precision data from the LHC," *Phys. Rev. D* **103** no. 1, (2021) 014013, arXiv:1912.10053 [hep-ph].

[18] R. Vega, R. Vega-Morales, and K. Xie, "Light (and darkness) from a light hidden Higgs," *JHEP* **06** (2018) 137, arXiv:1805.01970 [hep-ph].

[19] R. Vega, R. Vega-Morales, and K. Xie, "The Supersymmetric Georgi-Machacek Model," *JHEP* **03** (2018) 168, arXiv:1711.05329 [hep-ph].

[20] T.-J. Hou, S. Dulat, J. Gao, M. Guzzi, J. Huston, P. Nadolsky, C. Schmidt, J. Winter, K. Xie, and C. P. Yuan, "CT14 Intrinsic Charm Parton Distribution Functions from CTEQ-TEA Global Analysis," *JHEP* **02** (2018) 059, arXiv:1707.00657 [hep-ph].

[21] T.-J. Hou *et al.*, "Reconstruction of Monte Carlo replicas from Hessian parton distributions," *JHEP* **03** (2017) 099, arXiv:1607.06066 [hep-ph].

[22] K. Xie, W. Ke, W. Liang, X. Fu, C. Jiao, J. Pei, and F. Xu, "Collective rotations of fission isomers in actinide nuclei", *Sci. China Phys. Mech. Astron.* **57** (2014) 189-193.

Under review

[1] A. Dasgupta, P. S. B. Dev, T. Han, R. Padhan, S. Wang, and K. Xie, "Searching for Heavy Leptophilic Z': from Lepton Colliders to Gravitational Waves", arXiv:2308.12804 [hep-ph].

[2] A. Ablat, M. Guzzi, K. Xie, S. Dulat, and T.-J. Hou, I. Sitiwaldi, and C.-P., Yuan, "Exploring the impact of high-precision top-quark pair production data on the structure of the proton at the LHC" arXiv:2307.11153 [hep-ph].

[3] A. Freitas, Q. Song, and K. Xie, "Fermionic Electroweak NNLO Corrections to $e^+e^- \to ZH$ with Polarized Beams and Different Renormalization Schemes," arXiv:2305.16547 [hep-ph].

[4] K. Xie, B. Zhou, and T. J. Hobbs, "The Photon Content of the Neutron," arXiv:2305.10497 [hep-ph].

[5] K. Xie, J. Gao, T. J. Hobbs, D. R. Stump, and C.-P. Yuan, "High-energy neutrino deeply inelastic scattering cross sections from 100 GeV to 1000 EeV," arXiv:2303.13607 [hep-ph].

[6] J. M. Campbell *et al.*, "Event Generators for High-Energy Physics Experiments," in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.11110 [hep-ph].

[7] D. d'Enterria *et al.*, "The strong coupling constant: State of the art and the decade ahead," arXiv:2203.08271 [hep-ph]. (Submitted to Phys. Rept.)

Proceedings

[1] J. Reuter, T. Han, W. Kilian, N. Kreher, Y. Ma, T. Striegl, and K. Xie, "Precision test of the muon-Higgs coupling at a high-energy muon collider," *PoS* **ICHEP2022** (2022) 1239, arXiv:2212.01323 [hep-ph].

[2] M. Guzzi, A. Ablat, S. Dulat, T.-J. Hou, P. M. Nadolsky, I. Sitiwaldi, K. Xie, and C. P. Yuan, "Heavy-flavor impact on CTEQ-TEA global QCD analyses," *EPJ Web Conf.* **270** (2022) 00004, arXiv:2209.11143 [hep-ph].

[3] M. Guzzi, K. Xie, T.-J. Hou, P. Nadolsky, C. Schmidt, M. Yan, and C. P. Yuan, "CTEQ-TEA group updates: Photon PDF and Impact from heavy flavors in the CT18 global analysis," *PoS* **EPS-HEP2021** (2022) 370, arXiv:2110.11495 [hep-ph].

[4] M. Guzzi et al., "NNLO constraints on proton PDFs from the SeaQuest and STAR experiments and other developments in the CTEQ-TEA global analysis," *SciPost Phys. Proc.* **8** (2022) 005, arXiv:2108.06596 [hep-ph].

[5] K. Xie, J. M. Campbell, and P. M. Nadolsky, "A general-mass scheme for prompt charm production at hadron colliders," *SciPost Phys. Proc.* **8** (2022) 084, arXiv:2108.03741 [hep-ph].

[6] M. Guzzi, P. Nadolsky, and K. Xie, "Impact of heavy-quark production measurements in the CT18 global QCD analysis of PDFs," *SciPost Phys. Proc.* **8** (2022) 164, arXiv:2108.01791 [hep-ph].

[7] K. Xie, T. Hobbs, T.-J. Hou, C. Schmidt, M. Yan, and C.-P. Yuan, "The photon content of the proton in the CT18 global analysis," *SciPost Phys. Proc.* **8** (2022) 074, arXiv:2107.13580 [hep-ph].

[8] T.-J. Hou *et al.*, "Progress in the CTEQ-TEA NNLO global QCD analysis," arXiv:1908.11394 [hep-ph].

[9] T.-J. Hou *et al.*, "New CTEQ Global Analysis with High Precision Data from the LHC," arXiv:1908.11238 [hep-ph].

[10] T.-J. Hou *et al.*, "LHC and DIS experimental datain the CT18(Z) global QCD analysis," *PoS* **DIS2019** (2019) 021, arXiv:1909.00001 [hep-ph].

[11] O. Amat *et al.*, "Impact of LHC top-quark pair measurements to CTEQ-TEA PDF analysis," *PoS* **DIS2019** (2019) 017, arXiv:1908.06441 [hep-ph].

[12] C. P. Yuan *et al.*, "New CTEQ global analysis with high precision data from the LHC," *PoS* **DIS2019** (2019) 001.

[13] M. Guzzi, T.-J. Hou, S. Dulat, J. Gao, J. Huston, P. Nadolsky, C. Schmidt, J. Winter, K. Xie, and C. P. Yuan, "CTEQ-TEA parton distribution functions with intrinsic charm," *EPJ Web Conf.* **192** (2018) 00003, arXiv:1810.00264 [hep-ph].
[14] M. Guzzi, T.-J. Hou, S. Dulat, J. Gao, J. W. Huston, P. Nadolsky, C. Schmidt, J. Winter, K. Xie, and C. P. Yuan, "CTEQ-TEA parton distributions functions with intrinsic charm," *PoS* **DIS2017** (2018) 030.
[15] T.-J. Hou *et al.*, "CT14 Monte-Carlo parton distributions with positivity and asymmetric uncertainties," *PoS* **DIS2016** (2016) 034.

Community papers

[1] F. Maltoni *et al.*, "TF07 Snowmass Report: Theory of Collider Phenomena," arXiv:2210.02591 [hep-ph].
[2] M. Begel *et al.*, "Precision QCD, Hadronic Structure & Forward QCD, Heavy Ions: Report of Energy Frontier Topical Groups 5, 6, 7 submitted to Snowmass 2021," arXiv:2209.14872 [hep-ph].
[3] T. Bose *et al.*, "Report of the Topical Group on Physics Beyond the Standard Model at Energy Frontier for Snowmass 2021," arXiv:2209.13128 [hep-ph].
[4] K. Agashe *et al.*, "Report of the Topical Group on Top quark physics and heavy flavor production for Snowmass 2021," arXiv:2209.11267 [hep-ph].
[5] A. Belloni *et al.*, "Report of the Topical Group on Electroweak Precision Physics and Constraining New Physics for Snowmass 2021," arXiv:2209.08078 [hep-ph].
[6] K. M. Black *et al.*, "Muon Collider Forum Report," arXiv:2209.01318 [hep-ex].
[7] R. Abdul Khalek *et al.*, "Snowmass 2021 White Paper: Electron Ion Collider for High Energy Physics," in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.13199 [hep-ph].
[8] T. Han, Y. Ma, and K. Xie, "Electroweak fragmentation at high energies: A Snowmass White Paper," in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.11129 [hep-ph].
[9] **Muon Collider** Collaboration, N. Bartosik *et al.*, "Simulated Detector Performance at the Muon Collider," arXiv:2203.07964 [hep-ex].
[10] **Muon Collider** Collaboration, D. Stratakis *et al.*, "A Muon Collider Facility for Physics Discovery," arXiv:2203.08033 [physics.acc-ph].
[11] **Muon Collider** Collaboration, S. Jindariani *et al.*, "Promising Technologies and R&D Directions for the Future Muon Collider Detectors," arXiv:2203.07224 [physics.ins-det].
[12] **Muon Collider** Collaboration, J. de Blas *et al.*, "The physics case of a 3 TeV muon collider stage," arXiv:2203.07261 [hep-ph].
[13] **ILC International Development Team** Collaboration, A. Aryshev *et al.*, "The International Linear Collider: Report to Snowmass 2021," arXiv:2203.07622 [physics.acc-ph].
[14] **ν-Test** Collaboration, B. Batell, T. Ghosh, T. Han, and K. Xie, "Heavy Neutral Lepton Searches at the Electron-Ion Collider: A Snowmass Whitepaper," in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.06705 [hep-ph].
[15] K. Xie, M. Guzzi, and P. Nadolsky, "Probing heavy-flavor parton distribution functions at hadron colliders," in *2022 Snowmass Summer Study*. 3, 2022. arXiv:2203.06207 [hep-ph].
[16] S. Klein *et al.*, "New opportunities at the photon energy frontier," arXiv:2009.03838 [hep-ph].
[17] J. R. Andersen *et al.*, "Les Houches 2015: Physics at TeV Colliders Standard Model Working Group Report," in *9th Les Houches Workshop on Physics at TeV Colliders*. 5, 2016. arXiv:1605.04692 [hep-ph].
[18] T. Cheng, *et al.*, "Pre-CDR: Monte Carlo Tools for future collider projects." 6, 2014.

Recent presentations

Seminars

1. **Electroweak factorization and parton distribution functions**
   Physics Seminar, Wichita State University, Wichita, KS, 10/2023
2. **Electroweak parton distribution functions and their applications at future high-energy muon colliders**
   Theory Seminar, Jefferson Lab, Newport News, VA, 11/2022
   High Energy Physics Seminar, Michigan State University, East Lansing, MI, 09/2022
3. **Bread & Butter Physics at High-energy Muon Colliders**
   SYSU-PKU Collider Physics forum For Young Scientists, Virtual, 06/2022
   Department of Physics, Southern Methodist University, Dallas, TX, 04/2022
4. **The photon content of proton in the CT18 global analysis**
   Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland, 11/2021
5. **The partonic picture at high-energy lepton colliders**
   Seminar at Tsung-Dao Lee Institute & School of Physics and Astronomy, Shanghai Jiao Tong University, Shanghai, China, 06/2021
6. **Light Exotic Higgs Bosons at the LHC**
   Department of Physics, Southern Methodist University, Dallas, TX, 03/2019
   Theoretical Physics Department, Fermilab, Batavia, IL, 11/2018

Plenary talks

1. **New physics searches at the EIC**
   Electroweak and Beyond the Standard Model Physics at the EIC, INT Workshop, University of Washington, Seattle, WA, 02/2024
2. **Parton distribution functions at the electron-ion collider, forward physics facility and its impact on top-quark measurement at the LHC**
   16th International Workshop on Top Quark Physics (TOP2023), Traverse City, MI, 09/2023
3. **Heavy neutral leptons at the Electron-Ion Collider**
   1st International Workshop on a 2nd Detector for the Electron-ion Collider, Temple University, Philadelphia, PA, 05/2023
4. **Electroweak Factorization at High-Energy Muon Colliders**
   Muon Collider Workshop, KITP Program, University of California, Santa Barbara, CA, 02/2023
5. **New Physics Searches at the EIC**
   IAS Program on High Energy Physics (HEP 2023), the Hong Kong University of Science and Technology, Hong Kong, 02/2023
6. **Electroweak parton distributions at high-energy lepton colliders**
   Parton Distributions and Nucleon Structure, INT Workshop, University of Washington, Seattle, WA, 09/2022
7. **Electroweak Showers at High-Energy Colliders**
   Multi-Boson Interactions (MBI) 2022, Shanghai, China, 08/2022
8. **Heavy neutral lepton searches at the electron-ion collider**
   11th Workshop of the Long-Lived Particle Community, Virtual, CERN, 06/2022

9. **The partonic picture at high-energy lepton colliders**
   CTEQ Fall Meeting, Online, 12/2021
10. **Quark and gluon contents of a lepton at high energies**
    Muon Collider Physics and Detector Workshop, International Muon Collider Collaboration, 06/2021
11. **Electroweak Parton Distribution Functions**
    Winter 2021 topical meeting on VBS: VBS at Snowmass, VBSCan Action, 01/2021
12. **Standard Model physics at high-energy muon colliders**
    PITT PACC Worksop: Muon Collider Physics, University of Pittsburgh, PA, 12/2020

Parallel talks

1. **The Heavy-Flavor Production at the LHC**
   SM@LHC 2023, Fermilab, Batavia, IL, 07/2023
2. **High-energy neutrino cross sections**
   Phenomenology 2023 Symposium, University of Pittsburgh, PA, 05/2023
   PIKIMO Spring Meeting 2023, Ohio State University, OH, 04/2023
   APS April Meeting 2023, Minneapolis, MN, 04/2023
3. **Impacts of LHC Drell-Yan data in the CTEQ-TEA global fit**
   DIS 2023, Michigan State University, East Lansing, MI, 03/2023
4. **The small-x dynamics in the CTEQ-TEA PDFs and the application to the Forward Physics Facility**
   DIS 2023, Michigan State University, East Lansing, MI, 03/2023
5. **Overview of Parton Distribution Functions**
   Invited overview in the EF05/06/07 joint session, the Community Summer Study, Seattle, WA, 07/2022
6. **Electroweak fragmentations at high energies**
   Invited in EF04 Topical Group at the Community Summer Study, Seattle, WA, 07/2022
7. **Heavy Neutral Lepton Searches at the Electron-Ion Collider**
   PPC 2022, Washington University in St. Louis, Missouri, 06/2022
8. **The Update of the CT18QED Photon PDF**
   DIS 2022, Santiago de Compostela, Spain, 05/2022
9. **The parton distributions at small momentum fractions**
   DIS 2022, Santiago de Compostela, Spain, 05/2022
10. **Impacts of the LHC Drell-Yan data in the CTEQ-TEA global analysis**
    DIS 2022, Santiago de Compostela, Spain, 05/2022
11. **Precision Test of the Muon-Higgs Coupling at a High-energy Muon Collider**
    Higgs 2021, Stony Brook University, NY, 10/2021
    Invited talk in "Lepton Colliders" Session, SUSY 2021, ITP-CAS, Beijing, China, 08/2021
12. **Photon PDF and Impact from heavy flavors in the CT18 global analysis**
    The European Physical Society Conference on High Energy Physics, University of Hamburg and DESY, Germany, 07/2021
13. **Nonperturbative contributions to the photon PDF uncertainty in the CT18 global analysis**
    19th International Conference on Hadron Spectroscopy and Structure, Mexico City, Mexico, 07/2021

14. **The Photon PDF within the CT18 global analysis**
    2021 APS DPF Meeting, Florida State University, Tallahassee, FL, 07/2021
    DIS 2021, Stony Brook University, NY, 04/2021
15. **A next-to-leading order method general-mass method for heavy-flavor production at the LHC**
    DIS 2021, Stony Brook University, NY, 04/2021
16. **BSM Physics at the Electron Ion Collider: Searching for Heavy Neutral Leptons**
    Snowmass RF4 meeting, Virtual, 10/2020
17. **Small-x PDFs in the CTEQ-TEA global QCD analysis**
    Snowmass EF06 meeting, Virtual, 07/2020
18. **The Electroweak PDFs (I): the general considerations**
    Phenomenology 2020 Symposium, University of Pittsburgh, PA, 05/2020
19. **New CTEQ Global Analysis with High Precision Data from the LHC**
    8th PIKIMO Meeting, University of Cincinnati, OH, 11/2019
    APS April Meeting, Denver, CO, 04/2019
20. **Heavy flavor production at hadron colliders**
    QCD@LHC 2019, State University of New York at Buffalo, NY, 07/2019
    Phenomenology 2019 Symposium (Travel Award), University of Pittsburgh, PA, 05/2019
21. **Light Exotic Higgs Bosons in the Supersymmetric Georgi-Machacek Model**
    SUSY 2019, Texas A&M University - Corpus Christi, TX, 05/2019
22. **Next-to-leading order general-mass scheme for heavy-quark production at the LHC**
    Parton Distributions as a Bridge from Low to High Energies Workshop, Jefferson Lab, Newport News, VA, 11/2018
23. **Light (and darkness) from a light hidden Higgs**
    6th PIKIO Meeting, University of Notre Dame, IN, 10/2018
24. **The Supersymmetric Georgi-Machacek Model**
    Phenomenology 2018 Symposium, University of Pittsburgh, PA, 05/2018
25. **A hint of a new heavy particle at the LHC: *What do we see? What can it be?***
    Research Day Poster Session (Dean's Award), Southern Methodist University, Dallas, TX 02/2016
26. **Heavy-quark mass treatment for deep inelastic scattering at N3LO level**
    Fall 2015 Texas Section of APS Meeting (Travel Award), Baylor University, Waco, TX, 10/2015

Public tools

- I extend the Error PDF Updating Method Package (ePump) to simultaneously constrain the PDF and SMEFT parameters.
- I am the leading author for the S-ACOT-MPS package, *i.e.*, the Simplified Aivazis-Collins-Olness-Tung scheme with Massive Phase Space. It is designed to deal with the heavy-flavor hadroproduction, especially at the Large Hadron Collider (LHC).
- I develop and maintain the SARAH model files for the Supersymmetric Georgi-Machacek (SGM) Model, a decoupling limit of the Supersymmetric Custodial Triplet Model (SCTM), which gives a weakly coupled origin for the GM model at the electroweak scale.

Professional activities and service

- **Organization committee for conferences, workshops, and summer schools**
  - PITT PACC Workshops: Nu Tools for BSM at Neutrino Beam Facilities (2022); 11th PIKIMO (2021); LHC Run III Workshop (2021); Muon Collider Physics (2020)
  - 2022 CTEQ Summer School
  - LoopFest XX (2022)
  - Phenomenology Symposium, 2023, 2022, 2021, 2020
- **Convener** for 2021 CTEQ-MCnet Summer School (Virtual); Phenomenology Symposium 2019, Pittsburgh, PA; APS April Meeting 2019, Denver, CO
- **Referee** for journals and awards
  - *Journal of High Energy Physics*
  - *Physical Review D*
  - *Chinese Physics C*
  - *Nuclear Physics B*
  - *International Journal of Modern Physics A*
  - Advanced Scientific Computing Research Leadership Computing Challenge, 2022, 2023
- **Member** of the **CTEQ-TEA** and **PDF4LHC Working Group** Collaborations
- **Visitor** at Fermilab, 2017 – 2018; Michigan State University, 2016
- **Research Assistant**, Southern Methodist University, 2015 – 2019
  Nominee for the Student Employee of the Year, 2019
  Lightner-Sams Graduate Fellowship 2018
- **Teaching Assistant**, Southern Methodist University, 2014 – 2015
  Outstanding Teaching Assistant Award 2015

References

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