

Pavel M. Nadolsky

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Appointments

- **Michigan State University, Department of Physics & Astronomy**, Professor, 08/2024-present; Wu-Ki Tung Endowed Chair, 01/2025-present
- **Southern Methodist University, Department of Physics**: Professor, 09/2020-12/2024; Associate Professor, 09/2013-09/2020; Assistant Professor, 09/2008-08/2013

Education and training

- **Michigan State University, Department of Physics & Astronomy**: Postdoctoral researcher in High Energy Physics Theory group, 2007-2008
- **Argonne National Laboratory, High Energy Physics Division**: Postdoctoral researcher in High Energy Physics Theory group, 2004-2007
- **Southern Methodist University, Department of Physics**: Postdoc, 2001-2004
- **Michigan State University, Department of Physics & Astronomy**: Ph. D. in Physics, 1996-2001
- **Institute for High Energy Physics, Russia**: Candidate of Physical and Mathematical Sciences, 1992-1996
- **Lomonosov Moscow State University (Russia), Department of Physics**: M. Sc. in Physics; diploma with honors, 1986-1992

My publications

- The latest list of my publications, including citations, can be viewed in the INSPIRE database (http://bit.ly/nadolsky_inspire) and on Google Scholar (http://bit.ly/nadolsky_scholar). Publication record on INSPIRE, February 2025: 78 journal papers, 25,720 citations, $h_{HEP} = 46$ (journal publications only), 78 conference proceedings and reports.

Grants, contracts, sponsored research

- Principal Investigator, "Research in High-Energy Physics at Southern Methodist University", grant DE-SC0010129, co-PI: Fredrick Olness, US Department of Energy, 540,000 USD, April 2022 – March 2025
- Principal Investigator, "Research in High-Energy Physics at Southern Methodist University", co-PI: Fredrick Olness, US Department of Energy, 387,000 USD, April 2019 – March 2022
- Principal Investigator, "Research in High-Energy Physics at Southern Methodist University", grant DE-SC0010129 (co-PI: Fredrick Olness), US Department of Energy, 676,000 USD, April 2016 – March 2019
- Principal Investigator, "Studies of QCD structure in high-energy collisions", grant DE-SC0013681, US Department of Energy, 145,000 USD, April 2015 – March 2016
- Principal Investigator, "Integrated analysis of particle interactions at hadron colliders", Early Career Research Award DE-SC000387, US Department of Energy, 750,000 USD, April 2010 – April 2015
- Fermilab Universities Research Association Visiting Scholar Award, 40,000 USD, October 2022
- Inter-American Network of Networks of Quantum Chromodynamics Challenges, 6,200 USD (jointly with IFUNAM, Mexico), June 2022
- Moody Graduate School grant for a postdoc, 25,000 USD, September 2020
- DOE supplemental award for a Ph. D. student, 16,000 USD, 2017
- Dean's Dissertation Fellowship, 10,000 USD, Fall 2021
- Dean's Award for a Ph. D. student, 4,600 USD, Summer 2019
- Dean's Safety Net Support for a Ph. D. student, 6,000 USD, Summer 2019
- Investigator, LHC Theory Initiative Computing and Travel Fellowship Award, Sponsored by US Department of Energy, 15,000 USD, December 2007 – December 2009 (<http://bit.ly/NSwG1>)
- Instructional Technology Grant, sponsored by SMU Office of Provost, 4,500 USD, 2010
- Senior Engaged Learning Fellowship, 2018-2019; Hamilton Scholarship for undergraduate research, 2012, 2013, 2017; Summer Research Richter Fellowship, 2021

Professional activities and service

- **Chair**, Local Organizing Committee, LoopFest XXII workshop, SMU, May 2024
- **Co-convenor**, Snowmass'2021 Energy Frontier Topical Group 6 "Hadron structure, forward QCD, and hadron spectroscopy", 04/2020-10/2022
- **Co-spokesperson** of Coordinated Theoretical-Experimental project on Quantum chromodynamics (**CTEQ**, <http://www.cteq.org>), 2015-2021
- **Convener**, the Integrated Physics Analysis, PROSA collaboration, prosa.desy.de (until 2017)
- **Lecturer**, CTEQ summer school on QCD Analysis and Phenomenology, 2007, 2009, 2011, 2014, 2017-2019, 2022; TMD Collaboration School, 2017; HUGS school, 2019
- **Convener**, XXI International Workshop on Deep Inelastic Scattering and related subjects, Marseille, France, 2013; QCD @ LHC workshops, 2012, 2014, 2019; CTEQ-Fermilab LPC workshop, 2011 and 2013
- Organizing committee, CTEQ summer schools, 2016-present
- Local organizing committee, Light-cone QCD 2011 workshop, SMU, May 2011
- Local organizing committee, XXIII Workshop on Deep Inelastic Scattering and related subjects, SMU, Dallas, April 2015
- Organizing committee, Joint CTEQ meeting and 7th workshop on "Physics Opportunities at an Electron-Ion Collider", Philadelphia, PA, November 2016
- Organizing committee, Workshops on Monte-Carlo event simulations for the Electron-Ion Collider (MC4EIC), November 18-19, 2021 and November 16-18, 2022
- **Referee** for APS physics journals, Advances in High Energy Physics, Nuclear Physics B, Physics Letters B
- Member of the American Physical Society

University service

- Faculty Senate Tenure & Ethics Committee, SMU: Chair, AY 2023-24; Member, AY 2021-2022
- Dedman College Tenure Promotion Committee, SMU: Member, AY 2023-24
- Director of Graduate Studies, Department of Physics, SMU, 09/2017-07/2019
- SMU Faculty Senate member, 09/2016-08/2017

Recent public presentations

Invited lectures, seminars and colloquia

1. *Precision and replicability of parton distributions* (2 hours) – Workshop "QCD at the Femtoscale in the Era of Big Data", Institute for Nuclear Physics, University of Washington, 2024-06-13 and 2024-07-02
2. *Reinventing CTEQ for 2050's* – Michigan State University, 2024-02-15
3. *Parton distributions, big-data paradox, and intrinsic charm* – Florida State University, 2023-02-13
4. *A proton, as seen by Ant-Man and the Wasp* — colloquium, Kennesaw State University, 2023-02-10
5. *Proton's intrinsic charm remains concealed* (with T. J. Hobbs) – online seminar, International Light-Cone Advisory Committee, 2022-11-16
6. *Parton distributions meet the big-data paradox* – LHC Physics Center Forum, Fermilab, Batavia, IL, 2022-10-20
7. *Parton distributions, big-data paradox, and intrinsic charm* – Theory Seminar, Fermilab, Batavia, IL, 2022-10-18
8. *Introduction to quantum chromodynamics*, a 4-hour lecture, CTEQ Summer School, University of Pittsburgh, Pittsburgh, PA, July 2022
9. *Proton structure in the era of the Large Hadron Collider* – Texas A & M Commerce, 2022-04-14
10. *Complementarity of EIC and high-luminosity LHC: unpolarized PDFs and heavy-flavor production* – Round-table discussion, HADRON'21 conference, IF UNAM, Mexico, 2021-07-30
11. *Proton structure in the era of the Large Hadron Collider* – SMU, 2021-03-01
12. *Proton structure in the era of the Large Hadron Collider* – Baylor University, 2021-01-29
13. *Hadron structure in the era of the Large Hadron Collider* – Seminar Sandoval Vallarta, UNAM, Mexico, 2020-09-25
14. *Heavy quarks*– CTEQ Summer School, University of Pittsburgh, Pittsburgh, PA, 2019-07-23
15. *Parton distribution functions (PDFs) in the EIC era*, a 5-hour lecture at the HUGS'2019 Summer School, Jefferson Laboratory, June 2019
16. *Precise analysis of hadron structure for the LHC era* – DAMTP, University of Cambridge, UK, February 2019

17. *Precise analysis of hadron structure for the LHC era* – University of Tübingen, Germany, February 2019

Invited talks at conferences and workshops

1. *News from the CTEQ-TEA group* (with Marco Guzzi) – LHC Electroweak Working Group meeting, virtual, 2024-07-11
2. *Epistemic uncertainties of parton distributions* – Workshop “Inverse problems and uncertainty quantification in nuclear physics”, Institute for Nuclear Physics, University of Washington, 2024-07-08
3. *Proton structure for precise QCD calculations* – The Mitchell Conference on Collider, Dark Matter, and Neutrino Physics, Texas A & M University, 2024-05-24
4. *CTEQ-TEA parton distributions in a nutshell* — 31st International Workshop on Deep-Inelastic Scattering and Related Subjects, Michigan State University, 2024-04-09
5. *Cross-disciplinary studies of nucleon structure & replicability of precision HEP experiments* – DOE Early Career Award Network meeting, online, 2023-12-14
6. *Parton distribution functions in future DIS experiments* – Muon-Ion Collider workshop, Rice University, 2023-12-13
7. *Multivariate uncertainty quantification in the global analysis of proton structure* – workshop on Advanced Statistical Tools at the Intersection of cosmology and High-Energy & Nuclear Physics, UNAM, Mexico, 2023-12-06
8. *Nucleon parton distributions: precision meets replicability* – plenary talk, 15th European Research Conference on Electromagnetic Interactions with Nucleons and Nuclei, Paphos, Cyprus, 2023-11-01
9. *A nonperturbative charm PDF and its LHC signatures* – “Standard Model At LHC” workshop, Fermilab, 2023-07-11
10. *Extrinsic and intrinsic sea partons in a nucleon* – HADRON’2023 workshop, Genoa, Italy, 2023-06-08
11. *PDF uncertainties at small x* – Low- x and Diffraction Workshop 2022, Calabria, Italy, 2022-09-26
12. *Pictures from the QCD Frontier: Report of EF05, 06, and EF07 Topical groups* – Snowmass’2022 Community Summer Study, Seattle, WA, 2022-07-23
13. *PDF developments for Run 3 and HL-LHC* – LHC Physics 2022 Workshop, online, 2022-05-18
14. *Parton distributions: the tolerance puzzle and big-data paradox* – LoopFest 2022 Workshop, Pittsburgh, PA, 2022-05-13

15. *Studies of PDFs at Snowmass'2021* – CMS workshop on Standard Model Physics, 2021-05-11
16. *CTEQ-TEA parton distributions with the LHC data* – CMS Collaboration Standard Model Physics Working group, 2021-03-30
17. *QCD for inclusive forward charm production at the LHC* – Forward Physics Facility Kick-Off Workshop, 2020-11-10
18. *Heavy quarks and CTEQ-TEA PDFs at (N)NNLO* – CFNS workshop on Heavy Flavours, 2020-11-04
19. *Studies of PDFs at Snowmass'2021* – PDF4LHC meeting, 2020-10-02
20. *Discriminating models of meson structure using global QCD fits*, Pion-Kaon Workshop at Jefferson Lab, 2020-06-04
21. *CT18 parton distributions with the LHC Run-1 data*, CMS Monte Carlo generator group meeting, 2020-05-17
22. *Heavy quarks at (N)NNLO, Workshop on Jets and Heavy Flavors*, Santa Fe, NM, 2020-02-05
23. *Compatibility of LHC experiments in the CT18 global analysis* – Workshop on Ultimate Precision at Hadron Colliders, Université Paris-Saclay, France, 2019-11-27
24. *An overview of the results of the PDFLattice'2019 workshop* – Michigan State University, 2019-09-28
25. *The CT18 QCD analysis with the LHC experimental data* – LoopFest XVIII workshop, Fermilab, Batavia, IL, 2019-08-13
26. *Understanding the LHC experimental data in the CT18 global analysis* – 27th International Workshop on Deep Inelastic Scattering and Related Subjects, Torino, Italy, 2019-04-09
27. *The CT18 QCD analysis and benchmarking for electroweak precision experiments* – LHC EW Precision sub-group workshop, IPPP, Durham, UK, 2019-04-05
28. *CTEQ-TEA parton distribution functions now and in the future* – Workshop "Mapping PDFs and PDAs", ECT*, Trento, Italy, 2018-09-11

Other talks

1. *"Parsimonious" models for complex observations* – Summer program "Tightening the Gap Between Scattering Amplitudes and Events at the LHC at Higher Orders", Aspen Center for Physics, Aspen, CO, 2024-08-29
2. *Balancing precision and replicability* – PDF4LHC meeting, CERN, online, 2023-11-17

3. *Insights for the PDF4EIC effort from HEP, lattice QCD, and radiology* – CFNS workshop "Precision QCD for the EIC II", Stony Brook University, 2023-09-19
4. *Uncertainty quantification for PDFs and machine learning* – PhysTeV 2023 workshop, Les Houches, France, 2023-06-15
5. *CTEQ-TEA update, studies and tools to understand PDF uncertainties* – "W Boson mass days" workshop, CERN, Switzerland, 2023-04-18
6. *Update from CTEQ-TEA* – XXX International Workshop on Deep-Inelastic Scattering and Related Subjects, Michigan State University, 2023-03-27
7. *Update from CTEQ-TEA* – PDF4LHC meeting, CERN, 2022-11-23
8. *CTEQ-TEA parton distributions* – 29th International Workshop on Deep Inelastic Scattering and Related Subjects, Santiago de Compostela, Spain, 2022-05-03
9. *"Big data paradox" in the global analysis of proton structure* – APS April Meeting, New York, NY, 2022-04-10
10. *Precision QCD, Hadron Structure Forward QCD & Heavy Ions* – Snowmass'2022 Energy Frontier Workshop, Brown University, 2022-03-29
11. *QCD coupling strength in the CTEQ-TEA global PDF analysis* – ECT* alpha_s Workshop, Trento, Italy, 2022-02-01
12. *CTEQ-TEA parton distributions* – 28th International Workshop on Deep Inelastic Scattering and Related Subjects, Stony Brook, NY, 2021-04-13
13. *Update from CTEQ-TEA* – PDF4LHC meeting, CERN, 2021-03-22
14. *Summary of Energy Frontier Topical Group 6* – Snowmass'2021 Community Planning Meeting, 2020-10-06
15. *High-performance computing for global fits of parton distribution functions (PDFs)* – Snowmass'2021 Computational Frontier Workshop, 2020-08-11
16. *The CT18 QCD analysis with the LHC experimental data*, QCD@LHC workshop, SUNY Buffalo, 2019-07-15
17. *The curse of worldviews*, Think-Play-Hack 2019, SMU-in-Taos, 2019-07-03
18. *Mapping the sensitivity of future facilities to collinear PDFs with PDFSense* – 27th International Workshop on Deep Inelastic Scattering and Related Subjects, Torino, Italy, 2019-04-10

Outreach lectures and activities

1. *Impact of the artificial intelligence on the society and religion* – an invited speaker, 1-hour meeting with the parish of the "River of life" church, Dallas, 2023-11-26
2. *Time in physics and in Hollywood* – an outreach lecture, Dallas, 2020-09-02
3. *I am a physicist* – Greenhill School, Dallas, November 2018
4. *Physics of small and big* – Institute for Gifted Boys, SMU Simmons School of Education, Dallas, December 2013
5. *A virtual visit to ATLAS detector at CERN*, Organizer, Lamplighter school, Dallas, TX, January 2013
6. *(Anti-)matter of the day* — Quarknet Workshop for high-school teachers, SMU, Dallas, TX, August 2009

Teaching

Graduate students

	Name	Institution	Degree	Year	My role
1.	Anton Konychev	Indiana U.	Ph. D.	2006	Committee member
2.	Sophia Chabysheva	SMU	Ph. D.	2009	Committee member
3.	Kamile Dindar-Yagci	SMU	Ph. D.	2012	Committee member
4.	Renat Ishmukhametov	SMU	Ph. D.	2012	Committee member
5.	Zhihua Liang	SMU	Ph. D.	2012	Advisor
6.	Bowen Wang	SMU	Ph. D.	2015	Advisor
7.	Hang Qiu	SMU	Ph. D.	2017	Committee member
8.	Huanzhao Liu	SMU	Ph. D.	2015	Committee member
9.	Benjamin Clark	SMU	Ph. D.	2016	Committee member
10.	Jeffrey Hetherly	SMU	Ph. D.	2017	Committee member
11.	Keping Xie	SMU	Ph. D.	2019	Advisor
12.	Bo-Ting Wang	SMU	Ph. D.	2019	Advisor
13.	Maddie McKay	SMU	Ph. D.	2020	Committee member
14.	Xiaoxian Jing	SMU	Ph. D.	2021	Advisor
15.	Lucas Kotz	SMU	Ph. D.	2025 (exp.)	Advisor
16.	Max Ponce Chavez	SMU/MSU	Ph. D.	in progress	Advisor

Previously taught courses

1. *PHYS1304: Physics of a smartphone, or Introduction to Electricity and magnetism*, 9 semesters
2. *PHYS 4392: Electricity and magnetism for senior students*, 1 semester
3. *PHYS6321: Classical mechanics*, 1 semester

4. *PHYS6351: Statistical mechanics*, 3 semesters
5. *PHYS 7311 and PHYS 7312: Theory of electromagnetism*, 7 semesters
6. *PHYS 7314 and 7315: Quantum field theory*, 4 semesters
7. *PHYS8361: Quantum chromodynamics*, 1 semester
8. STAT 4195 "Big Data Corral" (co-instructor), 1 semester

Undergraduate research

1. Ryan Guess and Varada Purohit, 2021
2. Madeline Hamilton, 2017-2019
3. Sean Doyle, 2017-2018
4. Jiaxin Zhang, Summer 2015
5. Travis Covert, Summer 2013
6. Rafey Anwar, Summer 2012
7. Bridget Bertoni, Summer 2010
8. Jason South, Independent study on quantum mechanics, Fall 2011

Teaching presentations

1. *Just-in-Time Teaching (JiTT) in SMU statistics courses* – a CAUSE webinar, January 2017
2. *Just-in-Time Teaching (JiTT) in SMU physics and statistics courses* – a seminar, Center for Teaching Excellence, SMU, Dallas, February 2016
3. *Enlivening a large class* – Teaching Effectiveness Symposium, Center for Teaching Excellence, SMU, Dallas, August 2013

Pavel Nadolsky. Publications

- [1] M. G. Dainotti, S. Bhardwaj, C. Cook, J. Ange, N. Lamichhane, M. Bogdan, M. McGee, P. Nadolsky, M. Sarkar and A. Pollo, *et al.* “GRB Redshift Classifier to Follow-up High-Redshift GRBs Using Supervised Machine Learning,” [arXiv:2408.08763 [astro-ph.HE]].
- [2] A. Ablat, A. Courtoy, S. Dulat, M. Guzzi, T. J. Hobbs, T. J. Hou, J. Huston, K. Mohan, H. W. Lin and P. Nadolsky, *et al.* “New results in the CTEQ-TEA global analysis of parton distributions in the nucleon,” [arXiv:2408.04020 [hep-ph]].
- [3] J. Andersen, B. Assi, K. Asteriadis, P. Azzurri, G. Barone, A. Behring, A. Benecke, S. Bhattacharya, E. Bothmann and S. Caletti, *et al.* “Les Houches 2023: Physics at TeV Colliders: Standard Model Working Group Report,” [arXiv:2406.00708 [hep-ph]].
- [4] L. Kotz, A. Courtoy, P. Nadolsky, F. Olness and M. Ponce-Chavez, “Analysis of parton distributions in a pion with Bézier parametrizations,” *Phys. Rev. D* **109**, 074027 (2024) [arXiv:2311.08447 [hep-ph]].
- [5] X. Jing, *et al.* *Quantifying the interplay of experimental constraints in analyses of parton distributions*, *Phys. Rev. D* **108**, 034029 (2023), arXiv:2306.03918 [hep-ph].
- [6] A. Courtoy, P. Nadolsky, *From Data Defects to Response Functions: A View From Particle Physics*, *Harvard Data Science Review*, **5** (3), 2023, <https://doi.org/10.1162/99608f92.edae0c>.
- [7] M. Guzzi, T. J. Hobbs, K. Xie, J. Huston, P. Nadolsky and C.-P. Yuan, *The persistent nonperturbative charm enigma*, *Phys. Lett. B* **843**, 137975 (2023), arXiv:2211.01387 [hep-ph].
- [8] A. Courtoy, J. Huston, P. Nadolsky, K. Xie, M. Yan and C.-P. Yuan, *Parton distributions need representative sampling*, *Phys. Rev. D* **107**, 034008 (2023), arXiv:2205.10444 [hep-ph].
- [9] M. Yan, T. J. Hou, P. Nadolsky and C.-P. Yuan, *CT18 global PDF fit at leading order in QCD*, *Phys. Rev. D* **107**, 116001 (2023), arXiv:2205.00137 [hep-ph].
- [10] S. Amoroso, *et al.* [Editors: P. Nadolsky and M. Ubiali], *Snowmass 2021 Whitepaper: Proton Structure at the Precision Frontier*, *Acta Phys. Polon. B* **53**, 12-A1 (2022) arXiv:2203.13923 [hep-ph].
- [11] A. Accardi, P. Achenbach, D. Adhikari, A. Afanasev, C. S. Akondi, N. Akopov, M. Albaladejo, H. Albataineh, M. Albrecht and B. Almeida-Zamora, *et al.* “Strong interaction physics at the luminosity frontier with 22 GeV electrons at Jefferson Lab,” *Eur. Phys. J. A* **60**, 173 (2024) [arXiv:2306.09360 [nucl-ex]].
- [12] J. M. Campbell, M. Diefenthaler, T. J. Hobbs, S. Höche, J. Isaacson, F. Kling, S. Mrenna, J. Reuter, S. Alioli and J. R. Andersen, *et al.* “Event generators for high-energy physics experiments,” *SciPost Phys.* **16**, 130 (2024) doi:10.21468/SciPostPhys.16.5.130 [arXiv:2203.11110 [hep-ph]].

- [13] R. Abir, *et al.* *The case for an EIC Theory Alliance: Theoretical Challenges of the EIC*, arXiv:2305.14572 [hep-ph].
- [14] J. L. Feng, *et al.* *The Forward Physics Facility at the High-Luminosity LHC*, J. Phys. G **50**, 030501 (2023), arXiv:2203.05090 [hep-ex].
- [15] R. D. Ball *et al.* [PDF4LHC Working Group], *The PDF4LHC21 combination of global PDF fits for the LHC Run III*, J. Phys. G **49**, 080501 (2022), arXiv:2203.05506 [hep-ph].
- [16] M. Narain, *et al.* *The Future of US Particle Physics - The Snowmass 2021 Energy Frontier Report*, arXiv:2211.11084 [hep-ex].
- [17] 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].
- [18] R. Schwienhorst, *et al.* *Report of the Topical Group on Top quark physics and heavy flavor production for Snowmass 2021*, arXiv:2209.11267 [hep-ph].
- [19] R. A. Khalek, *et al.*, *Snowmass 2021 White Paper: Electron Ion Collider for High Energy Physics*, arXiv:2203.13199 [hep-ph].
- [20] D. d'Enterria, *et al.*, *The strong coupling constant: State of the art and the decade ahead*, arXiv:2203.08271 [hep-ph].
- [21] 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**, 00004 (2022) arXiv:2209.11143 [hep-ph].
- [22] K. Xie, M. Guzzi and P. Nadolsky, *Probing heavy-flavor parton distribution functions at hadron colliders*, arXiv:2203.06207 [hep-ph].
- [23] A. Courtoy and P. M. Nadolsky, *Large- x power laws of parton distributions remain inconclusive*, Rev. Mex. Fis. Suppl. **3**, no.3, 0308085 (2022), arXiv:2112.14329 [hep-ph].
- [24] 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*, arXiv:2110.11495 [hep-ph].
- [25] L. A. Anchordoqui, *et al.* *The Forward Physics Facility: Sites, Experiments, and Physics Potential*, Phys. Rept. **968**, 1 (2022), arXiv:2109.10905 [hep-ph].
- [26] M. Guzzi, *et al.* *NNLO constraints on proton PDFs from the SeaQuest and STAR experiments and other developments in the CTEQ-TEA global analysis*, arXiv:2108.06596 [hep-ph].
- [27] A. Courtoy and P. M. Nadolsky, *Nucleon and pion PDFs: large- x asymptotics meets functional mimicry*, arXiv:2108.04122 [hep-ph].

- [28] K. Xie, J. M. Campbell and P. M. Nadolsky, *A general-mass scheme for prompt charm production at hadron colliders*, arXiv:2108.03741 [hep-ph].
- [29] M. Guzzi, P. Nadolsky and K. Xie, *Impact of heavy-quark production measurements in the CT18 global QCD analysis of PDFs*, arXiv:2108.01791 [hep-ph].
- [30] J. Gao, T. J. Hobbs, P. M. Nadolsky, C. Sun and C.-P. Yuan, *General heavy-flavor mass scheme for charged-current DIS at NNLO and beyond*, Phys. Rev. D **105**, no.1, L011503 (2022) arXiv:2107.00460 [hep-ph].
- [31] R. Abdul Khalek, *et al.* *Science Requirements and Detector Concepts for the Electron-Ion Collider: EIC Yellow Report*, Nucl. Phys. A **1026**, 122447 (2022), arXiv:2103.05419 [physics.ins-det].
- [32] P. Agostini *et al.* [LHeC and FCC-he Study Group], *The Large Hadron-Electron Collider at the HL-LHC*, J. Phys. G **48**, no.11, 110501 (2021) arXiv:2007.14491 [hep-ex].
- [33] M. Constantinou, A. Courtoy, M. A. Ebert, M. Engelhardt, T. Giani, T. Hobbs, T. J. Hou, A. Kusina, K. Kutak and J. Liang, *et al.* *Parton distributions and lattice-QCD calculations: Toward 3D structure*, Prog. Part. Nucl. Phys. **121**, 103908 (2021) arXiv:2006.08636 [hep-ph].
- [34] A. Accardi, T. J. Hobbs, X. Jing and P. M. Nadolsky, *Deuterium scattering experiments in CTEQ global QCD analyses: a comparative investigation*, Eur. Phys. J. C **81**, 603 (2021) arXiv:2102.01107 [hep-ph].
- [35] A. Courtoy, P. M. Nadolsky, *Testing momentum dependence of the nonperturbative hadron structure in a global QCD analysis*, Phys. Rev., D103 (2021) 054029, arXiv:2011.10078 [hep-ph].
- [36] T.-J. Hou, J. Gao, T. Hobbs, K. Xie, S. Dulat, M. Guzzi, J. Huston, P. Nadolsky, J. Pumplin, C. Schmidt, I. Sitiwaldi, D. Stump, and C.-P. Yuan, *New CTEQ global analysis of quantum chromodynamics with high-precision data from the LHC*, Phys.Rev.D **103** (2021) 014013; arXiv:1912.10053 [hep-ph].
- [37] Karol Kovařík, Pavel M. Nadolsky, and Davison E. Soper, *Hadron structure in high-energy collisions*, Rev.Mod.Phys. **92** (2020) 4, 045003; arXiv:1905.06957 [hep-ph].
- [38] P. Agostini *et al.* [LHeC and FCC-he Study Group], *The Large Hadron-Electron Collider at the HL-LHC*, arXiv:2007.14491 [hep-ex].
- [39] M. Constantinou *et al.*, *Parton distributions and lattice QCD calculations: toward 3D structure*, Prog.Part.Nucl.Phys. **121** (2021) 103908, arXiv:2006.08636 [hep-ph].
- [40] S. Amoroso *et al.*, *Les Houches 2019: Physics at TeV Colliders: Standard Model Working Group Report*, arXiv:2003.01700 [hep-ph].
- [41] T. J. Hobbs, P. M. Nadolsky, F. I. Olness and B.-T. Wang, *Probing Nuclear Structure with Future Colliders*, arXiv:2001.07862 [hep-ph].

- [42] T. J. Hou *et al.* *New CTEQ Global Analysis with High Precision Data from the LHC*, arXiv:1908.11238 [hep-ph].
- [43] T. J. Hou *et al.* *LHC and DIS experimental data in the CT18(Z) global QCD analysis*, PoS **DIS2019** (2019), 021, arXiv:1909.00001 [hep-ph].
- [44] T. J. Hou *et al.*, *Progress in the CTEQ-TEA NNLO global QCD analysis*, arXiv:1908.11394 [hep-ph].
- [45] C.-P. Yuan *et al.*, *New CTEQ global analysis with high precision data from the LHC*, PoS **DIS2019** (2019), 001.
- [46] T. J. Hobbs, B. T. Wang, P. M. Nadolsky and F. I. Olness, *Collinear PDFs in the era of HL-LHC, LHeC, and EIC*, PoS **DIS2019** (2019), 247; arXiv:1907.00988 [hep-ph].
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