JINCHEN HE

Argonne National Laboratory, 9700 S Cass Ave, Lemont ⋄ Illinois, United States 60439
(+1) 240-413-9989 ⋄ jinchen@umd.edu ⋄ Personal Page

EDUCATION

University of Maryland, College Park *September 2022 - Present*
Doctoral of Philosophy (Ph.D.) in Physics

University of California, Berkeley *January 2020 - June 2020*
Exchange student in Physics

University of Chinese Academy of Sciences *September 2017 - June 2021*
Bachelor of Science (B.S.) in Physics

APPOINTMENTS

Argonne National Laboratory *August 2024 - Present*
Research Assistant

University of Maryland *September 2022 - Present*
Graduate Assistant

Shanghai Jiao Tong University *July 2021 - July 2022*
Research Assistant

HONORS AND AWARDS

Theory session Award for New Perspectives at Fermilab *2025*
Ralph Myers & Friends of Physics Award, Outstanding Teaching Assistant *2023*
Second Award of 2021 in Lattice Parton Collaboration *2021*
Academic Scholarship at University of Chinese Academy of Sciences *2017 - 2019*
Merit Student at University of Chinese Academy of Sciences *2017*
Excellent Student Cadre at University of Chinese Academy of Sciences *2017*

GRANTS AND PROPOSALS

Learning Field Transformations to Accelerate Hybrid Monte Carlo *June 2025 - Dec 2025*
Principal Investigator (PI) *ALCF*

· We propose to accelerate hybrid Monte Carlo simulations of lattice gauge fields via a neural network-constructed field transformation. We first apply this approach to the 2D U(1) gauge theory, and then plan to extend it to the SU(3) non-abelian case.
· 8,000 Nvidia A100 GPU hours of Sophia@ALCF.

3D Imaging of the Pion on a Fine Lattice *June 2024 - June 2026*
Principal Investigator (PI) *USQCD*

· We propose to calculate the transverse-momentum-dependent distribution (TMD) of the pion valence quark using staggered HISQ gauge configurations with clover fermions on the hypercubic (HYP) gauge background at the pion mass $m_\pi = 300$ MeV with fine spacing $a = 0.06$ fm.
· 130,000 Nvidia A100 GPU hours of LQ2@FNAL.

PROFESSIONAL SERVICE

Moderator of "AI for HEP" community on alphaXiv *April 2025 - Now*

- Manage the "AI for HEP" community on alphaXiv, including coordinating online discussions and curating topics at the intersection of high-energy physics and AI.
- Co-host online "AI for HEP" seminars for the community every two to three weeks, invite researchers to present their work, and facilitating interactive Q&A sessions.

MENTORING

Justin Dean *February 2024 - Now*
Undergraduate Student, Virginia Tech

- Guided Justin on a project studying the effects of Gribov copies in lattice calculations of gluon correlators.

Qi Cai *February 2022 - July 2022*
Undergraduate Student, Shanghai Jiao Tong University

- Provided guidance to Qi on foundational lattice gauge theory, covering core concepts of lattice QCD as well as the computation and analysis of two-point correlation functions.

PUBLICATIONS

Lead-author publications

- D. Bollweg, X. Gao, **J. He**, S. Mukherjee and Y. Zhao (Apr. 2025). "*Transverse-momentum-dependent pion structures from lattice QCD: Collins-Soper kernel, soft factor, TMDWF, and TMDPDF*", Phys. Rev. D 112, (2025) 3 arXiv:2504.04625 [hep-lat]
- X. Gao, **J. He**, R. Zhang and Y. Zhao (Aug. 2024). "*Systematic Uncertainties from Gribov Copies in Lattice Calculation of Parton Distributions in the Coulomb gauge*", Chin.Phys.Lett. 41 (2024) 12 arXiv:2408.05910 [hep-lat]
- **J. C. He** *et al.* (Lattice Parton Collaboration) (Nov. 2022). "*Unpolarized Transverse-Momentum-Dependent Parton Distributions of the Nucleon from Lattice QCD*", Phys.Rev.D 109 (2024) 11 arXiv:2211.02340 [hep-lat]
- **J. He**, D. A. Brantley, C. C. Chang, *et al.* (CalLat Collaboration) (Apr. 2021). "*Detailed analysis of excited state systematics in a lattice QCD calculation of g_A*", Phys.Rev.C 105 (2022) 6 arXiv:2104.05226 [hep-lat]
- **[In preparation]** "*Scaling Field-Transformed HMC on 2D U(1) Gauge Theory*"
- **[In preparation]** "*Systematic Studies of Nucleon PDFs from Boosted Correlations in the Coulomb Gauge*"
- **[In preparation]** "*Physical limit of the soft function using the Coulomb gauge method*"

Key-contributor publications

- J. W. Chen, X. Gao, **J. He**, *et al.* (May 2025). "*LaMET's Asymptotic Extrapolation vs. Inverse Problem*", arXiv:2505.14619 [hep-lat]
- H. Liu, **J. He**, L. Liu, *et al.* (Jul. 2022). "*Hidden-charm Hexaquarks from Lattice QCD*", Sci.China Phys.Mech.Astron. 67 (2024) 1 arXiv:2207.00183 [hep-lat]
- J. Hua, M. H. Chu, **J. C. He**, *et al.* (Lattice Parton Collaboration) (Jan. 2022). "*Pion and Kaon Distribution Amplitudes from Lattice QCD*", Phys.Rev.Lett. 129 (2022) 13 arXiv:2201.09173 [hep-lat]

Contributor publications

- X. Gao, **J. He**, Y. Su, R. Zhang and Y. Zhao (Aug. 2024). "*Comments on 'Non-local Nucleon Matrix Elements in the Rest Frame'*", arXiv:2408.04674 [hep-lat]
- M. H. Chu, **J. C. He**, J. Hua, *et al.* (Lattice Parton Collaboration) (Jun. 2023). "*Lattice calculation of the intrinsic soft function and the Collins-Soper kernel*", JHEP 08 (2023) 172 arXiv:2306.06488 [hep-lat]
- M. H. Chu, **J. C. He**, J. Hua, *et al.* (Lattice Parton Collaboration) (Feb. 2023). "*Transverse-Momentum-Dependent Wave Functions of Pion from Lattice QCD*", Phys.Rev.D 109 (2024) 9 arXiv:2302.09961 [hep-lat]

- **[In preparation]** "*Probing the Critical Point: Can AI reason through frontier physics research?*"

SEMINARS AND CONFERENCE PRESENTATIONS

Seminars

- "Effective field theory for positronium in relativistic motion", Nuclear Theory Seminar, University of Maryland, April 17, 2025.
- "NRQED: Lamb Shift and Relativistic Hydrogen Atom", Theory Seminar, Argonne, January 12, 2024.
- "Unpolarized Nucleon TMDPDFs from LQCD", EFT Seminar, Technische Universität München, November 24, 2023.

Invited Talks

- "3D Imaging of the Pion on a Fine Lattice", 15th Conference on the Intersections of Particle and Nuclear Physics, University of Wisconsin–Madison, June 12, 2025.
- "Imaging of the Pion on a Fine Lattice", USQCD All-Hands Meeting, Online, April 19, 2024.
- "Unpolarized Nucleon TMDPDFs from LQCD", TMDs: Towards a Synergy between Lattice QCD and Global Analyses, Stony Brook University, June 22, 2023.

Contributed Talks

- "3D Imaging of the Pion on a Fine Lattice", New Perspectives 2025, Fermilab, July 15, 2025.
- "Nucleon Parton Distribution Functions from Boosted Correlators in CG", APS Topical Group on Hadronic Physics, Anaheim, March 16, 2025.
- "Effective Field Theory for Positronium in Relativistic Motion", Midwest Theory Get Together, Argonne, October 18, 2024.
- "Systematic Uncertainties from Gribov Copies in CG-Fixed Correlators", QGT Topical Collaboration Meeting, Temple University, September 13, 2024.
- "Systematic Uncertainties from Gribov Copies in Lattice Calculation of Quasi-distributions in the Coulomb gauge", LaMET 2024, University of Maryland, August 14, 2024.
- "Nucleon TMDPDFs from Lattice QCD", Phenomenology Symposium 2023, University of Pittsburgh, May 8, 2023.
- "Unpolarized Transverse-Momentum-Dependent PDF from Lattice QCD", LaMET 2022, Argonne, December 2, 2022.
- "Pion and Kaon Distribution Amplitudes with LaMET", LaMET 2021, Online, December 8, 2021.
- "Distribution amplitudes from lattice QCD with LaMET", International Workshop on Heavy Quark Physics, Online, November 24, 2021.

Poster Presentation

- "Nucleon Parton Distribution Functions from Boosted Correlators in CG", Physics Opportunities at an Electron-Ion Collider XI, Florida International University, February 25, 2025.

SKILLS

Softwares & Programming	Python, Linux, XML, C++, Git, Mathematica, LaTeX, QUDA
Clusters	OLCF(Andes/Frontier), OLCF(NERSC), ALCF(Polaris/Sophia) FNAL(LQ2), LCRC(Swing/Improv)
Languages	Chinese (Native) English (Professional Working Proficiency)