

Mengyao Huang

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(a) Employment

- Postdoctoral Researcher 5/2023 – present
Nuclear Data and Theory Group, Nuclear and Chemical Sciences Division
Physical and Life Sciences Directorate
Lawrence Livermore National Laboratory Livermore, CA, USA
- Postdoctoral Research Associate 3/2022 – 5/2023
Department of Physics and Astronomy
Iowa State University Ames, IA, USA

(b) Visiting Scholar Position

- Visiting Scientist 5/2023 – present
Department of Physics and Astronomy
Iowa State University Ames, IA, USA

(c) Education

- Ph.D. in Physics** (GPA: 3.91) 8/2016 – 12/2021
Iowa State University Ames, IA, USA
– Thesis Advisor: James P. Vary
– Thesis: Quantum many body structure and transition with computational methods
- M.S. in Nuclear Physics** (GPA: 3.90) 8/2016 – 8/2020
Iowa State University Ames, IA, USA
– Thesis Advisor: James P. Vary
– Thesis: Zero mode correction for the critical coupling in (1+1)-dimensional ϕ^4 theory
- B.S. in Physics** (GPA: 3.63) 9/2012 – 6/2016
Central China Normal University (CCNU) Wuhan, Hubei, China
– Undergraduate Research Advisors: Xiangming Sun (CCNU) and Nu Xu (Lawrence Berkeley National Laboratory, CA, USA)
– Thesis: Preliminary study of *Topmetal* TPC silicon detector for low-energy solar neutrinos

(d) Peer-reviewed Publications

6. **Mengyao Huang**, Kyle A. Wendt, Nicolas F. Schunck and Erica M. Holmbeck, Quantifying uncertainty in machine learning on nuclear binding energy (accepted by *Physical Review C*), [arXiv: 2504.09013](https://arxiv.org/abs/2504.09013)
– I studied the epistemic uncertainty quantification of machine learning in the application of extrapolating nuclear binding energies.
5. **Mengyao Huang** and James P. Vary, Transitions in (1+1) light front ϕ^4 theory using quantum computing method (in preparation, to be submitted to *Physical Review A*)
– I studied the phase transitions in (1+1) ϕ^4 theory in discrete light-cone quantization (DLCQ) framework using both classical computing and quantum computing methods. I employed the

Variational Quantum Eigensolver (VQE) quantum algorithm using IBM Qiskit software.

4. **Mengyao Huang**, Tobias Frederico, Peng Yin, and James P. Vary, *Ab initio* method for examining the halo structure of ${}^6\text{He}$. II. A novel semiclassical 3D modeling method, to be submitted to *Physical Review C* ([Link](#))
– I created a 3D modeling method to extract geometric structural information of ${}^6\text{He}$, such as the two-“halo” neutron separation angle and separation RMS distance.
3. **Mengyao Huang**, Tobias Frederico, Pieter Maris, Peng Yin, Robert A. M. Basili, Mark A. Caprio, Patrick J. Fasano, and James P. Vary, *Ab initio* method for examining the halo structure of ${}^6\text{He}$. I. Coordinate space two-nucleon correlations, to be submitted to *Physical Review C* ([Link](#))
– I studied the geometric structure of exotic nuclei such as ${}^6\text{He}$ with loosely bound “halo” neutrons, using two-body observables evaluated by solving many-body Schrödinger equation with realistic nucleon-nucleon interactions (the *ab initio* method).
2. James P. Vary, **Mengyao Huang**, Shreeram Jawadekar, Mamoon Sharaf, Avaroth Harindranath, and Dipankar Chakrabarti, Critical coupling for two-dimensional ϕ^4 theory in discretized light-cone quantization, *Physical Review D* **105**, 016020 (Jan, 2022), DOI: [10.1103/PhysRevD.105.016020](https://doi.org/10.1103/PhysRevD.105.016020)
– I developed “lfphi4MH-00” C/C++ code combining with LAPACK Fortran 90 package running on supercomputers. I also contributed in finding the extrapolation methods.
1. **Mengyao Huang**, Hua Pei, Xiangming Sun, and Shuguang Zou, Simulation study of energy resolution with changing pixel size for radon monitor based on *Topmetal-II*⁻ TPC, *Nuclear Science and Techniques* **30**, 16 (Jan, 2019), DOI: [10.1007/s41365-018-0532-8](https://doi.org/10.1007/s41365-018-0532-8)
– I simulated a radioactive ${}^{222}\text{Ra}$ -emitted α particle time projection chamber (TPC) silicon detector using Geant4 and ROOT and introduced a phenomenology expression for fitting the data.

(e) (Peer-reviewed) Working Group Papers

5. [Quantum Information Science for U.S. Nuclear Physics Long Range Planning workshop](#), Santa Fe, New Mexico Jan. 31 – Feb. 1, 2023
– White paper “Quantum Information Science and Technology for Nuclear Physics. Input into U.S. Long-Range Planning, 2023” ([arXiv: 2303.00113](https://arxiv.org/abs/2303.00113))
4. [2022 Town Meeting for Fundamental Symmetries, Neutrons and Neutrinos](#) (Hybrid), Chapel Hill, North Carolina Dec. 13 – 15, 2022
– White paper “Fundamental Symmetries, Neutrons, and Neutrinos (FSNN): Whitepaper for the 2023 NSAC Long Range Plan” ([arXiv: 2304.03451](https://arxiv.org/abs/2304.03451))
3. [2022 Town Hall Meeting on Hot and Cold QCD](#), hosted in a Hybrid format by Massachusetts Institute of Technology Laboratory for Nuclear Science and Department of Physics Sep. 23 – 25, 2022
– Peer-reviewed paper “The present and future of QCD”, *Nuclear Physics A*, **1047**, 122874 (July, 2024). DOI: [10.1016/j.nuclphysa.2024.122874](https://doi.org/10.1016/j.nuclphysa.2024.122874)
2. [Fundamental Symmetries at FRIB Workshop](#) Nov. 17 – 19, 2022
– White paper “Nuclear β decay as a probe for physics beyond the standard model”, 2022 Fundamental Symmetries, Neutrons, and Neutrinos (FSNN) Town Meeting at UNC ([arXiv: 2301.03975](https://arxiv.org/abs/2301.03975))
1. [Solar Fusion Cross Sections III Workshop](#), David Brower Center and University of California, Berkeley, Berkeley, CA, USA July 26 – 29, 2022
– I was actively involved in WG1 and WG5.
– Peer-reviewed paper “Solar fusion III: New data and theory for hydrogen-burning stars” accepted to *Reviews of Modern Physics* ([arXiv: 2405.06470](https://arxiv.org/abs/2405.06470))

(f) Invited Talks

4. **Mengyao Huang** et al., Transitions and critical coupling in (1+1) ϕ^4 theory with discretized light-cone quantization framework, University of Science and Technology of China, Hefei, China
Jan. 3, 2024
3. **Mengyao Huang** et al., Transitions in (1+1) light front ϕ^4 theory using a quantum computing method, Workshop for Tensor Networks in Many Body and Quantum Field Theory, Institute for Nuclear Theory, University of Washington, Seattle, WA, USA. [Schedule](#) and [Slides](#) April 3, 2023
2. **Mengyao Huang**, Quantum collective phenomena and their impacts on nuclear reactions, postdoctoral interview seminar, TRIUMF (Canada's national particle accelerator centre) Theory Department, Vancouver, BC, Canada Dec. 15, 2022
1. **Mengyao Huang**, Quantum collective phenomena and their impacts on nuclear reactions, postdoctoral interview seminar, Nuclear and Chemical Sciences Division, Physical and Life Sciences Directorate, Lawrence Livermore National Laboratory, Livermore, CA, USA Dec. 12, 2022

(g) Contributed Talks

11. **Mengyao Huang** et al., Quantifying uncertainty in machine learning on nuclear binding energy, Network for Neutrinos, Nuclear Astrophysics and Symmetries (N3AS) Summer School, University of California, Santa Cruz, Santa Cruz, USA July 13, 2025
10. **Mengyao Huang** et al., Harnessing AI for nuclear masses, 2024 Information and Statistics in Nuclear Experiment and Theory meeting (virtual), Fudan University, Shanghai, China Nov. 14, 2024
9. **Mengyao Huang** et al., Harnessing AI for nuclear masses, 2024 Physical and Life Science Postdoc Poster Symposium, Lawrence Livermore National Laboratory, Livermore, CA, USA Aug. 13, 2024
8. **Mengyao Huang** et al., Quantifying uncertainty of nuclear properties within machine learning frameworks, American Physics Society April meeting 2024, Sacramento, CA, USA April 3, 2024
7. **Mengyao Huang** et al., Quantifying uncertainty of nuclear properties within machine learning frameworks, APS DNP meeting 2023, Hilton, Waikoloa Village, Hawaii's Big Island, HI, USA. [Abstract](#) Dec. 1, 2023
6. **Mengyao Huang** et al., Transitions in (1+1) light front ϕ^4 theory using quantum computing method, APS April meeting 2023, Minneapolis, MN, USA. [Abstract](#) and [Poster](#) April 16, 2023
5. **Mengyao Huang** et al., Transitions in (1+1) light front ϕ^4 theory using quantum computing method, "Quantum Information Science for US Nuclear Physics Long Range Planning – 2022" workshop, Santa Fe, NM, USA. [Presenters](#), [Slides](#) and [Schedule](#) Jan. 31, 2023
4. **Mengyao Huang**, Extracting geometrical structure information of nucleus from *ab initio* calculation driven 3D modeling, The 33rd Midwest Theory Get Together at Argonne National Laboratory, Lemont, IL, USA. [Slides](#) Sept. 30, 2022
3. **Mengyao Huang** et al., Transitions in (1+1) light front ϕ^4 theory using quantum computing method, National Nuclear Physics Summer School at Massachusetts Institute of Technology, Cambridge, MA, USA. [Abstract](#) and [Poster](#) July 15, 2022
2. **Mengyao Huang** et al., *Ab initio* method for examining the halo structure of ${}^6\text{He}$, APS April meeting 2021 (Virtual). [Abstract](#) and [Poster \(Video Recording\)](#) April 19, 2021
1. **Mengyao Huang** et al., The zero mode effect on critical coupling for 1+1 ϕ^4 theory, APS DNP meeting 2020 (Virtual). [Abstract](#) and [Poster](#) Nov. 1, 2020

(h) Other Academic Presentations

2. **Mengyao Huang**, Time Projection Chamber in low-rate nuclear experiment, advance nuclear physics course presentation [Slides](#) Dec. 4, 2018
1. **Mengyao Huang**, Preliminary exploration on *Topmetal* time projection chamber silicon detector for detecting low energy solar neutrinos, undergraduate thesis defense, Central China Normal University. [Slides](#) May 13, 2016

(i) Summer Schools

8. [Neutrinos, Nuclear Astrophysics and Symmetries \(N3AS\) Summer School](#), University of California, Santa Cruz, Santa Cruz, USA July 11 – 20, 2025
7. [U.S. Quantum Information Science Summer School \(USQIS\)](#), Fermi National Accelerator Laboratory, Batavia, IL, USA Aug. 6 – 15, 2023
6. [Quantum Computing Bootcamp](#), Jefferson Lab, Newport News, VA, USA June 20 – 30, 2023
5. [Information and Statistics in Nuclear Experiment and Theory Workshop \(ISNET-9\) \(virtual\)](#), Washington University in St. Louis, St. Louis, MO, USA May 22 – 26, 2023
4. [2022 National Nuclear Physics Summer School](#), Massachusetts Institute of Technology, Cambridge, MA, USA July 11 – 22, 2022
3. [Facility for Rare Isotope Beams \(FRIB\) Theory Alliance Summer School: Quantum Computing and Nuclear Few- and Many-Body Problems](#), Michigan State University, East Lansing, MI, USA June 20 – 22, 2022
2. [2021 PKU Summer School on Applied Mathematics \(virtual\)](#), Peking University, Beijing, China July 12 – Aug. 6, 2021
1. [First Computational and Data Science School for High Energy Physics](#), Princeton University, Princeton, NJ, USA July 10 – 13, 2017

(j) Trainings & Skills

- High performance computing skills 2/2019 – Present
 - Three years of parallel computing experience using MPI and OpenMP on Cori at NERSC (supercomputer located at Lawrence Berkeley National Laboratory, Berkeley, CA, USA)
 - Attending NERSC Training Series (Virtual) for GPU, Machine Learning, Perlmutter (NERSC's next supercomputer), etc.
- Quantum computing application
 - Performing quantum simulation using quantum optimal control 5/2023 – Present
 - Performing quantum simulation using IBM Qiskit 12/2021 – Present
 - Attending ISU Quantum Computing Group Seminar Series 10/2020 – Present
- Machine/Deep learning application on nuclear physics
 - Using deep learning techniques to uncover nuclear physics from the fundamental level, obtaining reliable prediction and uncertainty of a theoretical model 5/2023 – Present
- Detector simulation skills
 - Detector simulation using LArSoft for DUNE 3/2017 – 4/2018 (Deep Underground Neutrino Experiment at Fermilab, Batavia, IL, USA)
 - Detector simulation using Geant4 and ROOT 1/2014 – 1/2019 (CERN's simulation and data processing tools for high energy physics)
- Teaching experience 8/2016 – 5/2021

- **Iowa State University Astronomy Classes:**
 - Undergraduate recitation classes “The Sky and the Solar System” and “Stars, Galaxies, and Cosmology” lecturer
 - Online courses “North Star Astronomy” and “Evening Star” instructor
- **Iowa State University Physics Classes:**
 - Undergraduate physics labs “General Physics” and “Introduction to Classical Physics” instructor
 - Senior physics-major classes “Classical Mechanics”, “Thermal Physics” and “Introduction to Modern Physics” grader
- **Miscellaneous Skills**
 - C/C++, Python, Fortran, Unix Shell, OpenMP, MPI, ROOT, Geant4, Matlab, Mathematica, Lingo/Lindo, \LaTeX
 - Photoshop, Adobe Premiere

(k) Awards

- Travel Award, by [2022 National Nuclear Physics Summer School](#), Massachusetts Institute of Technology, Cambridge, MA, USA 6/2022
- Travel Award, by [First Computational and Data Science School for High Energy Physics](#), Princeton University, Princeton, NJ, USA 6/2017
- Outstanding Graduate Award, Central China Normal University 6/2016
- First Prize in Hubei Province, Contemporary Undergraduate Mathematical Contest in Modeling, awarded by China Society for Industrial and Applied Mathematics 12/2014
- Second Prize, Central China Normal University Mathematical Contest in Modeling 12/2014
- Third Prize, The 7th Annual Central China Mathematical Modeling Invitational Competition, awarded by Wuhan Society for Industrial and Applied Mathematics 5/2014
- Third Prize in Hubei Province, Contemporary Undergraduate Mathematical Contest in Modeling, awarded by China Society for Industrial and Applied Mathematics 12/2013
- Third Prize, Central China Normal University Mathematical Contest in Modeling 11/2013
- Second Prize in College, China Undergraduate Physics Tournament, awarded by College of Physical Science and Technology of Central China Normal University 6/2013

(l) Scholarships

- Scholarship to Nuclear Physics Long Range Plan, Fundamental Symmetries, Neutrinos, and Neutrons (FSNN), [2022 FSNN Town Meeting](#), University of North Carolina at Chapel Hill, NC, USA 11/2022
- “Yin-gui” Scholarship, for academic excellence, Central China Normal University 10/2015
- “Dan-gui” Scholarship, for academic excellence, Central China Normal University 10/2014
- College Scholarship, for outstanding academic performance, Central China Normal University 1/2014
- College Scholarship, for outstanding academic performance, Central China Normal University 1/2013

(m) Memberships

- [Facility for Rare Isotope Beams \(FRIB\) Theory Alliance Member](#)
- American Physical Society (APS) Early Career Member

(n) Academic Service

- Journal referee, European Physical Journal: Special Topics
- Student Presentation Session Host, Nuclear Astrophysics and Symmetries (N3AS) Summer School, University of California, Santa Cruz, Santa Cruz, CA, USA July 16, 2025

- Program Committee Member, Quantum Computing Algorithms, Systems and Applications (Q-CASA) Workshop, [38th IEEE International Parallel and Distributed Processing Symposium](#) May 27 – 31, 2024
- Program Committee Member, Quantum Computing Algorithms, Systems and Applications (Q-CASA) Workshop, [37th IEEE International Parallel and Distributed Processing Symposium](#) May 15 – 19, 2023

(o) Town Hall Meeting Participations

- 2022 Fundamental Symmetries, Neutrons, and Neutrinos (FSNN) Town Meeting at UNC ([virtual](#)) Dec. 13 – 15, 2022
- 2022 NSAC Long-Range Plan Town Hall Meeting on Nuclear Structure, Reactions and Astrophysics at Argonne National Laboratory ([in-person](#)) Nov. 14 – 16, 2022
- 2022 Town Hall Meeting on Hot & Cold QCD at MIT ([virtual](#)) Sep. 23 – 25, 2022

(p) Other Workshops Participations

- Quantum Few- and Many-Body Systems in Universal Regimes, Institute for Nuclear Theory, University of Washington, Seattle, WA, USA Oct. 21 – 25, 2024
- Pulses, Qudits and Quantum Simulations, InQubator for Quantum Simulation, University of Washington, Seattle, WA, USA April 15 – 26, 2024

(q) Self-managed Grants

- Undergraduate Research Grant (B2014185): High spatial resolution neutron detector based on *Topmetal* silicon sensor 6/2014 – 9/2015
Student PIs: Lei Deng, Yang Li and Mengyao Huang (Faculty Advisor: Xiangming Sun)
Funded by College of Physical Science and Technology of Central China Normal University

(r) Literature Publications

- Invited literature article, “Memories in my college Chinese literature class”, in *Precious memories between teachers and students (in Chinese)*, edited by Man-zhen Wu, Central China Normal University Press, 2021, pp. 356–357 (ISBN:9787562293026) 5/2021

(s) Hobbies

- Music and Instruments: Singing, Recorder
- Activities: Hiking, Ping-pong