

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 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
– Thesis Advisor: Xiangming Sun
Undergraduate Research Co-advisor: Nu Xu (Lawrence Berkeley National Laboratory, CA, USA)
– Thesis: Preliminary study of *Topmetal* TPC silicon detector for low-energy solar neutrinos

(d) Peer-reviewed Journal Publications

5. **Mengyao Huang** and James P. Vary, Transitions in (1+1) light front ϕ^4 theory using quantum computing method, to be submitted to *Physical Review A* ([Link](#))
– 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) Upcoming Journal Publications

1. “DLCQ calculation of the critical coupling in (1+1) light front ϕ^4 theory with zero mode included” to be submitted to *Physical Review D*
– Continue the research shown in my Master’s thesis (DOI: [10.31274/etd-20200902-65](https://doi.org/10.31274/etd-20200902-65)), where the difference between light front methods and equal-time frame methods (e.g. the Lattice methods) on the critical coupling of (1+1) ϕ^4 theory was discussed.

(f) Invited Talks

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

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) Working Group Reports

3. White paper "Quantum Information Science and Technology for Nuclear Physics. Input into U.S. Long-Range Planning, 2023" ([arXiv: 2303.00113](#)) Feb. 28, 2023
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](#))
1. [Solar Fusion Cross Sections III Workshop](#), David Brower Center and University of California, Berkeley, Berkeley, CA, USA July 26 – 29, 2022
– Supported by Network for Neutrinos, Nuclear Astrophysics, and Symmetries (N3AS), National Science Foundation (NSF)
– I am actively involved in WG1 and WG5.
– Results will be submitted to *Reviews of Modern Physics* as a group effort in the upcoming “Solar Fusion III” report, following the previous reports “[Solar Fusion I](#)” and “[Solar Fusion II](#)”,

(j) Summer Schools

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

(k) 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 on quantum field theories
 - Performing quantum simulation using IBM Qiskit 12/2021 – Present
 - Attending ISU Quantum Computing Group Seminar 10/2020 – Present
- Machine/Deep learning application on nuclear physics
 - Using deep learning techniques to uncover nuclear physics from the fundamental level, obtain 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
 - **Astronomy**: Recitation sessions of “The Sky and the Solar System” and “Stars, Galaxies, and Cosmology”; Online courses “North Star Astronomy” and “Evening Star”
 - **Physics**: Lab sessions of “General Physics” and “Introduction to Classical Physics” for undergraduates; Grader of senior physics-major courses “Classical Mechanics”, “Thermal Physics” and “Introduction to Modern Physics”
- Miscellaneous Skills
 - C/C++, Python, Fortran, Unix Shell, OpenMP, MPI, ROOT, Geant4, Matlab, Mathematica, Lingo/Lindo, L^AT_EX
 - Photoshop, Adobe Premiere

(l) 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

(m) 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
- Central China Normal University “Yin-gui” Scholarship, for academic excellence 10/2015
- Central China Normal University “Dan-gui” Scholarship, for academic excellence 10/2014
- Central China Normal University College Scholarship, for outstanding academic performance 1/2014
- Central China Normal University College Scholarship, for outstanding academic performance 1/2013

(n) Memberships

- [FRIB Theory Alliance Member](#)
- APS Member

(o) Academic Service

- Committee Member, Q-CASA (Quantum Computing Algorithms, Systems and Applications) Workshop in [International Parallel and Distributed Processing Symposium 2023](#) May 15 – 19, 2023

(p) 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

(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 article (in Chinese), “Memories of my college Chinese literature class”, in *The precious memories between teachers and students*, 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