YIN LIN 林胤

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Enrico Fermi Institute, University of Chicago, Chicago, IL 60637 USA

EMPLOYMENT

Postdoctoral Associate in Theoretical Physics Sep 2021 - 2024
Center for Theoretical Physics
Massachusetts Institute of Technology, Boston, MA USA

EDUCATION

Ph.D. in Theoretical Physics 2015 - June 2021
The University of Chicago, Chicago, IL USA

B.Sc. in Physics 2011 - 2015
Arnold Nordsieck Award, Physics Highest Academic Honors, Valedictorian
University of California Santa Barbara, Santa Barbara, CA USA

RESEARCH INTERESTS

High-energy particle theory, lattice quantum chromodynamics (LQCD), artificial intelligence, nuclear physics, high-performance computing, quantum information science

RESEARCH PROJECTS

Lattice Quantum Chromodynamics (LQCD) 2017 - present
Advisor: Andreas S. Kronfeld, Fermilab/University of Chicago
– Solved the long-standing theoretical issues with simulating nucleons with staggered fermion discretization in lattice quantum chromodynamics that enabled more efficient Monte-Carlo simulation and implemented the solutions in high-performance software.
– Optimized the software performance in systems with GPU accelerators by adapting a hybrid OpenMP-MPI programming paradigm.
– Analyzed Monte-Carlo dataset with Bayesian statistics to infer the internal structure of nucleons crucial to the future neutrino scattering experiments.
– Investigated novel techniques with machine learning to accelerate simulations.

Theoretical Cosmology 2014 - 2015
Advisor: Siang Peng Oh, University of California Santa Barbara
– Performed 21cm simulations during the cosmic reionization to understand the morphology of ionized intergalactic medium, aka the bubbles.
– Compared different schemes in characterizing the bubble sizes and proposed a new method, the Watershed algorithm, based on the image segmentation technique to properly capture their physical size distribution.

Experimental Astrophysics 2013 - 2014
Advisor: Ben Mazin, University of California Santa Barbara
– Designed and implemented an astrometry library in Python to calibrate telescope position using reference images so the captured images can be properly aligned and passed to the next stage in the processing pipeline.

PUBLICATIONS

[1] **Y. Lin**, A. S. Meyer, S. Gottlieb, C. Hughes, A. S. Kronfeld, J. N. Simone, and A. Strelchenko, "*Computing Nucleon Charges with Highly Improved Staggered Quarks*," (2020), under peer review, arXiv:2010.10455 [hep-lat] .

[2] **Y. Lin**, A. S. Meyer, C. Hughes, A. S. Kronfeld, J. N. Simone, and A. Strelchenko, *"Nucleon mass with highly improved staggered quarks,"* Phys. Rev. D **103**, 034501 (2021), arXiv:1911.12256 [hep-lat] .

[3] **Y. Lin**, C. Hughes, and A. S. Meyer, *"Nucleon and Ω Baryon Masses with All-HISQ Fermions at the Physical Point,"* in *37th International Symposium on Lattice Field Theory* (2019) arXiv:1912.00028 [hep-lat] .

[4] **Y. Lin**, S. P. Oh, S. R. Furlanetto, and P. M. Sutter, *"The Distribution of Bubble Sizes During Reionization,"* Mon. Not. Roy. Astron. Soc. **461**, 3361 (2016), arXiv:1511.01506 [astro-ph.CO] .

[5] J. C. van Eyken, M. J. Strader, A. B. Walter, S. R. Meeker, P. Szypryt, C. Stoughton, K. O'Brien, D. Marsden, N. K. Rice, **Y. Lin**, and B. A. Mazin, *"The ARCON Pipeline: Data Reduction For MKID Arrays,"* The Astrophysical Journal Supplement Series **219**, 14 (2015).

SELECTED PRESENTATIONS

Staggering Nucleon Matrix Elements 2020
2020 MIT Virtual Lattice Field Theory Colloquium
http://ctp.lns.mit.edu/latticecolloq/

Nucleon Mass and Omega Mass with All-HISQ Fermions at the Physical Point 2019
The 37th International Symposium on Lattice Field Theory, Wuhan, China
https://indico.cern.ch/event/764552/contributions/3420488/

Nucleon Physics with All HISQ Fermions 2018
The 36th International Symposium on Lattice Field Theory, East Lansing, USA
https://indico.fnal.gov/event/15949/contributions/34661/

TEACHING AND OUTREACH

Data Visualization Workshop 2020
Lecturer for data visualization of COVID-19 data with Python for Chicago public high-school students.
https://github.com/yling10095/Data_visualization_2020

Analog and Digital Electronics 2017
Teaching assistant for the undergraduate analog and digital electronics lab at the University of Chicago. Held two lab sessions weekly.

Introductory Physics 2015-2016
Teaching assistant for the introductory physics classes at the University of Chicago. Held weekly discussion sessions and office hours.

AWARDS AND HONORS

URA Visiting Scholars 2017 & 2021
Fermilab

Arnold Nordsieck Award 2015
University of California Santa Barbara

Physics Highest Academic Honors 2015
University of California Santa Barbara

CCS Summer Undergraduate Fellowship 2014
University of California Santa Barbara

Worster Summer Research Fellowship 2014
University of California Santa Barbara

RESOURCES SECURED

The ASCR Leadership Computing Challenge 2020-2021
Project: Nucleon Axial Charge with All-Staggered Lattice QCD
– 200,000 KNL-node-hours on Theta supercomputer
– 870,000 KNL-node-hours on Cori supercomputer

USQCD Type-A Allocation 2020-2021
Project: Nucleon Axial Form Factor with HISQ Ensembles
– 1,100,000 Skylake core-hours on Brookhaven National Laboratory cluster
– 100,000 K80-GPU-hours on Brookhaven National Laboratory cluster

USQCD Type-A Allocation 2019-2020
Project: Nucleon Axial Form Factor with HISQ Ensembles
– 1,000,000 Skylake core-hours on Fermilab cluster
– 120,000 K80-GPU-hours on Brookhaven National Laboratory cluster

USQCD Type-A Allocation 2018-2019
Project: Nucleon Axial Form Factor with HISQ Ensembles
– 1,800,000 Skylake core-hours on Brookhaven National Laboratory cluster
– 105,000 K80-GPU-hours on Brookhaven National Laboratory cluster