

YIN LIN 林胤

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Enrico Fermi Institute, The University of Chicago, Chicago, IL 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), nuclear physics, high-performance computing

RESEARCH PROJECTS

Lattice Quantum Chromodynamics (LQCD)

2017 - present

Advisor: Andreas Kronfeld, Fermilab

- Solved the long-standing theoretical issues with simulating staggered baryons 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.
- The results were published in [1]–[3].

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 popular schemes in characterizing the bubble sizes and proposed a new method, the Watershed algorithm, based on the image segmentation technique to properly capture their physics size distribution.
- The results were published in [4].

Experimental Astrophysics

2013 - 2014

Advisor: Ben Mazin, University of California Santa Barbara

- Designed 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.
- The results were published in [5].

PUBLICATIONS

- [1] Y. **Lin**, A. S. Meyer, S. Gottlieb, C. Hughes, A. S. Kronfeld, J. N. Simone, and A. Strelchenko, “Nucleon Matrix Elements with Staggered Baryons,” 2020, in preparation.
- [2] Y. **Lin**, A. S. Meyer, C. Hughes, A. S. Kronfeld, J. N. Simone, and A. Strelchenko, “Nucleon Mass with Highly Improved Staggered Quarks,” 2019. 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.*, vol. 461, no. 3, pp. 3361–3374, 2016. DOI: 10.1093/mnras/stw1542. 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*, vol. 219, no. 1, p. 14, Jul. 2015. DOI: 10.1088/0067-0049/219/1/14.

SELECTED PRESENTATIONS

Staggering Nucleon Matrix Elements	2020
<i>Asia-Pacific lattice conference 2020</i>	
https://conference-indico.kek.jp/event/113/contributions/2129/	
Nucleon Mass and Omega Mass with All-HISQ Fermions at the Physical Point	2019
<i>The 37th International Symposium on Lattice Field Theory, Wuhan, China</i>	
https://indico.cern.ch/event/764552/contributions/3420488/	
Nucleon Physics with All HISQ Fermions	2018
<i>The 36th International Symposium on Lattice Field Theory, East Lansing, USA</i>	
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/ylin910095/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
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