

# YIN LIN 林胤

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

## EDUCATION

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### 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

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

## RESEARCH PROJECTS

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### 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 physical 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

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- [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  $\Omega$  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

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- Staggering Nucleon Matrix Elements** 2020  
*Asia-Pacific lattice conference 2020*  
<https://conference-indico.kek.jp/event/113/contributions/2129/>
- 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

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- 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](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

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- 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

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- 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