

# Fangzhao Alex An

Physics Ph.D. Student

University of Illinois at Urbana-Champaign

faan2@illinois.edu



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## Education

**Ph.D. Physics** – 2020 (*expected*)

University of Illinois at Urbana-Champaign

**B.S. Physics** – 2014

Harvey Mudd College

High Distinction and Department Honors – 3.91 GPA

## Research Experience

**Bryce Gadway Lab** – University of Illinois at Urbana-Champaign

2014 –  $\infty$

- ▷ Quantum simulation of tight-binding models with cold atoms in momentum-space optical lattices.
- ▷ Built BEC/optical lattice apparatus from the ground up.

**Theresa Lynn Lab** – Harvey Mudd College

2011 – 2014

- ▷ Undergraduate thesis: Simulated and experimentally probed slowly rotating modes of light.
- ▷ Earlier work: Improved entanglement of photon orbital angular momentum for quantum cryptography.

**Vanessa Sih Lab** – University of Michigan

2013

- ▷ Constructed imaging setup to observe new generation of GaAs/InGaAs samples.
- ▷ Helped fabricate semiconductor samples for use in spintronics research.

**Richard Haskell Lab** – Harvey Mudd College

2012 – 2013

- ▷ Improved and implemented ISAM algorithm on GPUs to speed up frequency-domain optical coherence microscopy.

## Teaching Experience

**Physics Tutor** – University of Illinois at Urbana-Champaign

2015 – 2016

- ▷ Conducted one-on-one tutoring with students taking calculus-based and non-calculus Mechanics and Electromagnetism.

**E&M Lab TA** – University of Illinois at Urbana-Champaign

2014

- ▷ Guided students of calculus-based E&M (Physics 212) through experiments.
- ▷ Taught three sections, held office hours, and graded assignments.

**Academic Excellence Facilitator** – Harvey Mudd College

2012 – 2014

- ▷ Tutored groups of students in core physics courses: Special Relativity, Classical Mechanics, and Electromagnetic Theory & Optics.

**Physics Tutor** – Harvey Mudd College 2013

- ▷ Conducted one-on-one tutoring with students taking introductory and advanced physics courses.

**Lab Assistant** – Harvey Mudd College 2012 – 2013

- ▷ Set up, tested, and maintained experiments for introductory physics lab, sophomore physics choice lab, and modern lab.

**Physics Grader** – Harvey Mudd College 2011 – 2012

- ▷ Graded Special Relativity and Classical Mechanics.

## Awards and Honors

Drickamer Research Fellowship . . . . .	2019
Lindau Nobel Laureate Meeting . . . . .	2019
UIUC University Fellowship . . . . .	2016
HMC Dean's List . . . . .	2011-2014
Rojansky Writing Award for Quantum Physics . . . . .	2012
CRC Press Chemistry Achievement Award . . . . .	2011
National Merit Scholarship . . . . .	2010
Arcadia High School Salutatorian . . . . .	2010

## Publications

11. *Exploring quantum signatures of chaos on a Floquet synthetic lattice*  
Eric J. Meier, Jackson Ang'ong'a, **Fangzhao Alex An**, and Bryce Gadway  
[\*Phys. Rev. A\* \*\*100\*\*, 013623 \(2019\).](#) [[arXiv](#)]
10. *Engineering tunable local loss in a synthetic lattice of momentum states*  
Samantha Lapp, Jackson Ang'ong'a, **Fangzhao Alex An**, and Bryce Gadway  
[\*New J. Phys.\* \*\*21\*\*, 045006 \(2019\).](#) [[arXiv](#)]
9. *Observation of the topological Anderson insulator in disordered atomic wires*  
Eric J. Meier, **Fangzhao Alex An**, Alexandre Dauphin, Maria Maffei, Pietro Massignan, Taylor L. Hughes, and Bryce Gadway  
[\*Science\* \*\*362\*\*, 929 \(2018\).](#) [[arXiv](#)]
8. *Engineering a flux-dependent mobility edge in disordered zigzag chains*  
**Fangzhao Alex An**, Eric J. Meier, and Bryce Gadway  
[\*Phys. Rev. X\* \*\*8\*\*, 031045 \(2018\).](#) [[arXiv](#)]
7. *Correlated dynamics in a synthetic lattice of momentum states*  
**Fangzhao Alex An**, Eric J. Meier, Jackson Ang'ong'a, and Bryce Gadway  
[\*Phys. Rev. Lett.\* \*\*120\*\*, 040407 \(2018\).](#) [[arXiv](#)]
6. *Diffusive and arrested transport of atoms under tailored disorder*  
**Fangzhao Alex An**, Eric J. Meier, and Bryce Gadway  
[\*Nat. Commun.\* \*\*8\*\*, 325 \(2017\).](#) [[arXiv](#)]

5. *Direct observation of chiral currents and magnetic reflection in atomic flux lattices*  
**Fangzhao Alex An**, Eric J. Meier, and Bryce Gadway  
[\*Sci. Adv.\* \*\*3\*\*, e1602685 \(2017\).](#) [arXiv]
4. *Observation of the topological soliton state in the Su-Schrieffer-Heeger model*  
Eric J. Meier, **Fangzhao Alex An**, and Bryce Gadway  
[\*Nat. Commun.\* \*\*7\*\*, 13986 \(2016\).](#) [arXiv]
3. *Atom optics simulator of lattice transport phenomena*  
Eric J. Meier, **Fangzhao Alex An**, and Bryce Gadway  
[\*Phys. Rev. A\* \*\*93\*\*, 051602\(R\) \(2016\).](#) [arXiv]
2. *Experimental Realization of Slowly Rotating Modes of Light*  
**Fangzhao A. An**  
[HMC Senior Theses, Paper 53 \(2014\).](#)
1. *Robust, real-time, digital focusing for FD-OCM using ISAM on a GPU*  
Luke R. St. Marie, **Fangzhao A. An**, Anthony L. Corso, John T. Grasel, and Richard C. Haskell  
[\*Proc. SPIE\* \*\*8934\*\*, 89342W \(2014\).](#)

## Presentations

### Talks

4. DAMOP 2019  
*Many-body effects in momentum-space lattices*  
Milwaukee, WI, May 2019
3. DAMOP 2017  
*Engineering arbitrary synthetic gauge fields in multiple geometries*  
Sacramento, CA, Jun 2017
2. Midwest Cold Atom Workshop 2016 (invited)  
*Studying disorder and topology using atomic momentum states*  
University of Chicago, Oct 2016
1. DAMOP 2016  
*Disordered quantum walks in a momentum-space lattice*  
Providence, RI, May 2016

### Posters

8. Midwest Cold Atom Workshop 2018  
*Many-body effects in synthetic lattices*  
University of Illinois at Urbana-Champaign, Oct 2018
7. International Conference on Atomic Physics (ICAP) 2018  
*Many-body effects in synthetic lattices*  
Barcelona, Spain, July 2018
6. Midwest Cold Atom Workshop 2017  
*Ultracold atom dynamics in tailored disorder and synthetic gauge fields*  
University of Michigan, Oct 2017

5. DAMOP 2017  
*Ultracold atom dynamics in tailored disorder and synthetic gauge fields*  
Sacramento, CA, Jun 2017
4. Midwest Cold Atom Workshop 2016  
*Engineering synthetic gauge fields with arbitrary flux patterns*  
University of Chicago, Oct 2016
3. DAMOP 2016  
*Atom optics simulator of lattice transport phenomena*  
Providence, RI, May 2016
2. Midwest Cold Atom Workshop 2015  
*Towards studying topological matter with cold atoms in optical lattices*  
University of Wisconsin-Madison, Nov 2015
1. Southwest Quantum Information and Technology Workshop 2014  
*Toward quantum communication with qudits: measuring orbital angular momentum entangled photon pairs from SPDC*  
Santa Fe, NM, Feb 2014