

Eric J. Meier | CV

Postdoctoral Research Associate, Gadway Lab
Department of Physics, The University of Illinois at Urbana-Champaign

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Education

- Ph.D. physics** **2019**
The University of Illinois at Urbana-Champaign
Thesis: *Momentum-Space Lattices for Ultracold Atoms*, Advisor: Bryce Gadway
- B.S. physics, cum laude** **2014**
Denison University. Granville, Ohio
Thesis: *Statistical Modeling of Jets in Active Galactic Nuclei*, Advisor: Dan Homan

Research

Postdoctoral

- Postdoctoral Research Associate, Gadway/DeMarco Lab** **2019–Present**
The University of Illinois at Urbana-Champaign
I am working with three different teams in the lab. (1) My primary role is the construction of a ground state sodium-rubidium molecule apparatus for use in quantum information experiments. (2) I am building a system that will use potassium Rydberg atoms trapped in optical tweezers for analog quantum simulation experiments. (3) I help in a mentorship role on the Bose-Einstein condensate apparatus I constructed as part of my graduate work.

Graduate

- Research Assistant, Advisor: Bryce Gadway** **2014–2019**
The University of Illinois at Urbana-Champaign
As the first graduate student in the Gadway Lab, I built and operated a rubidium Bose-Einstein condensate apparatus that engineered synthetic lattices of atomic momentum-states for the analog quantum simulation of condensed matter phenomena.

Undergraduate

- Researcher, Advisor: Steven Olmschenk** **2014**
Denison University. Granville, Ohio
I worked toward building a trapped ion quantum computing system using lanthanum ions.
- Researcher, Advisor: Dan Homan** **2012–2014**
Denison University. Granville, Ohio
I wrote computer simulations of relativistic extragalactic jets in an effort to match typical observed acceleration profiles found in the MOJAVE program database.

Skills

Experimental Physics Skills

Laser Operation, Alignment, & Locking • Vacuum Chamber Assembly & Baking • Experimental Optimization with Machine Learning • Electromagnet Design & Control (including high-fields for Feshbach Resonances) • Optical Fibers & Fiber Coupling • Data Analysis • Computer Simulation • Basic Electronics Design • Surface-Mount and Through-Hole Soldering • Atomic Spectroscopy Techniques (Saturated Absorption, Polarization, Modulation Transfer) • Resonant Atomic Imaging • 2D and 3D Magneto-Optical Trapping • Optical Pumping • Optical Molasses • Optical Dipole Trapping & Evaporation • Bose–Einstein Condensation • Two-Species Mixtures • Light-Induced Atomic Desorption • Digital Micromirror Devices • Active Optical Elements (Tapered Amplifiers, Acousto- and Electro-Optic Modulators, Shutters, Raman Fiber Amplifiers) • Radio-Frequency Source Design and Implementation • Optical Cavity Laser Locking • Basic Woodworking & Machining

Computer Skills & Languages

Adobe Photoshop & Illustrator • Wolfram Mathematica • Matlab • Python • 3D Modeling and Design in Solidworks • Andor Basic • Microsoft Office • Computer Assembly • L^AT_EX • American Sign Language (beginner)

Soft Skills

Flexibility • Effective and Clear Communication • Attention to Detail • Teamwork & Cooperation • Time Management • Internal Motivation

Publications

Selected

11. *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**, 6417 (2018)
 - selected for a [research highlight in Nature Physics](#)
10. *Observation of the topological soliton state in the Su-Schrieffer-Heeger model*
Eric J. Meier, Fangzhao Alex An, and Bryce Gadway.
[Nature Communications](#) **7**, 13986 (2016)
9. *Atom-optics simulator of lattice transport phenomena*
Eric J. Meier, Fangzhao Alex An, and Bryce Gadway.
[Physical Review A](#) **93**, 051602(R) (2016)

Other

8. *Observation of tunable mobility edges in generalized Aubry–André lattices*
Fangzhao Alex An, Karmela Padavić, **Eric J. Meier**, Suraj Hegde, Sriram Ganeshan, J. H. Pixley, Smitha Vishveshwara, and Bryce Gadway.
[arXiv:2007.01393](#) (2020)

7. *Nondestructive dispersive imaging of rotationally excited ultracold molecules*
Qingze Guan, Michael Highman, **Eric J. Meier**, Garrett R. Williams, Vito Scarola, Brian DeMarco, Svetlana Kotochigova, and Bryce Gadway.
[Physical Chemistry Chemical Physics](#) **22**, 20531 (2020)
6. *Counterdiabatic control of transport in a synthetic tight-binding lattice*
Eric J. Meier, Kinfung Ngan, Dries Sels, and Bryce Gadway.
[Physical Review Research](#) **2**, 043201 (2020)
o selected as *Editor's Suggestion*
5. *Exploring quantum signatures of chaos on a Floquet synthetic lattice*
Eric J. Meier*, Jackson Ang'ong'a*, Fangzhao Alex An, and Bryce Gadway.
[Physical Review A](#) **100**, 013623 (2019)
o selected as *Editor's Suggestion*
4. *Engineering a flux-dependent mobility edge in disordered zigzag chains*
Fangzhao Alex An, **Eric J. Meier**, and Bryce Gadway.
[Physical Review X](#) **8**, 031045 (2018)
3. *Correlated dynamics in a synthetic lattice of momentum states*
Fangzhao Alex An, **Eric J. Meier**, Jackson Ang'ong'a, and Bryce Gadway.
[Physical Review Letters](#) **120**, 040407 (2018)
2. *Diffusive and arrested transport of atoms under tailored disorder*
Fangzhao Alex An, **Eric J. Meier**, and Bryce Gadway.
[Nature Communications](#) **8**, 325 (2017)
1. *Direct observation of chiral currents and magnetic reflection in atomic flux lattices*
Fangzhao Alex An, **Eric J. Meier**, and Bryce Gadway.
[Science Advances](#) **3**, e1602685 (2017)

Presentations

Oral Presentations

5. BEC2018X (invited)
Quantum simulation of one-dimensional topological insulators with cold atoms
December 2018 at the University of Tsukuba in Tokyo, Japan
4. Midwest Cold Atom Workshop 2017 (invited)
Correlated phenomena in synthetic momentum-space lattices
November 2017 at the University of Michigan in Ann Arbor, Michigan
3. DAMOP 2019, Session: "Dynamics of Cold Atoms in Optical Lattices"
Fast eigenstate preparation in a synthetic lattice by counter-diabatic driving
May 2019 in Milwaukee, Wisconsin
2. DAMOP 2017, Session: "New Topological Quantum Matter"
Disordered topological wires in a momentum-space lattice
June 2017 in Sacramento, California

1. DAMOP 2016, Session: "Progress in Spin-Orbit Coupling"
Direct observation of edge states in the Su-Schrieffer-Heeger model with bosonic atoms in a momentum space lattice
May 2016 in Providence, Rhode Island

Posters

7. Midwest Cold Atom Workshop 2019
Evidence for the topological Anderson insulator
November 2019 at Northwestern University in Evanston, Illinois
6. International Conference on Atomic Physics 2018
Evidence for the topological Anderson insulator
July 2018 in Barcelona, Spain
5. Midwest Cold Atom Workshop 2017
Disordered topological wires
November 2017 at the University of Michigan in Ann Arbor, Michigan
4. DAMOP 2017
Disordered wires and quantum chaos in a momentum-space lattice
June 2017 in Sacramento, California
3. Midwest Cold Atom Workshop 2016
Quantum simulation of topological wires
October 2016 at the University of Chicago in Chicago, Illinois
2. DAMOP 2016
Atom optics simulator of lattice transport phenomena
May 2016 in Providence, Rhode Island
1. Midwest Cold Atom Workshop 2015
Towards studying topological matter with cold atoms in optical lattices
November 2015 at the University of Wisconsin at Madison

Honors and Awards

- 2018:** Drickamer Research Fellowship, University of Illinois at Urbana-Champaign
○ a graduate fellowship awarded to a student who has demonstrated significant ability in research
- 2016:** Scott Anderson Award, University of Illinois at Urbana-Champaign
○ recognizes the year's outstanding physics graduate teaching or research assistants
- 2014:** Samuel C. Wheeler Award for Excellence in Physics, Denison University
○ excellence in the understanding and doing of physics combined with leadership in the department
- 2012, 2013:** Physics Department Fellow, Denison University
- 2012:** Inducted, Sigma Pi Sigma National Physics Honor Society
- 2012, 2013:** Anderson Summer Research Assistantship Award, Denison University
○ funding for summer-term research awarded to excellent proposals in all fields of science
- 2012:** Ron Winters Emeritus Faculty Scholar Award, Denison University
○ outstanding undergraduate physics research

2011: Excellence in Introductory Physics Award, Denison University

2009: Boy Scouts of America Eagle Scout Award. Troop 11, Kingsville, Ohio

Teaching

Graduate.....

Teaching Assistant, College Physics: E&M & Modern **2018, 2019**

The University of Illinois at Urbana-Champaign

I taught small class sections (30 students) in this second introductory physics course for non-majors.

- o Ranked 'Excellent Teacher' based on student evaluations

Teaching Assistant, Introductory Mechanics **2014**

The University of Illinois at Urbana-Champaign

I taught small class sections (30 students) in this introductory physics course for physics majors.

- o Ranked 'Excellent Teacher' based on student evaluations

Undergraduate.....

Laboratory Teaching Assistant, Introductory Astronomy **2013–2014**

Denison University. Granville, Ohio

In addition to teaching students how to use reflecting and refracting telescopes and aiding them in their observations, I was in charge of telescope assembly, disassembly, and storage.

Laboratory Teaching Assistant, Introductory Physics **2012–2014**

Denison University. Granville, Ohio

Working in conjunction with the course's professor, I facilitated students in performing their experiments.

University Tutor **2011–2014**

Denison University. Granville, Ohio