

# Fangzhao Alex An

✉ [fangzhaoan@gmail.com](mailto:fangzhaoan@gmail.com) ☎ (626)698-8392 📍 Minneapolis, MN

## Experience

- 2020–current **Advanced Physicist**, *Quantinuum*.
- Achieved world-record qubit State Preparation and Measurement (SPAM) fidelity of  $> 99.99\%$  with a new state preparation technique general to a wide class of ion species. Exceeded expectations tenfold and shifted company focus to new ion species for future quantum computers.
  - Set up a new trapped ion quantum computing teststand, including assembling vacuum chamber, setting up electronics/hardware, building laser beamlines, and both writing new Python code and adapting extensive internal company packages.
  - Worked efficiently both solo and in teams with 1-3 other Ph.D. physicists. Regularly communicated with and exchanged ideas with scientists, technicians, machinists, engineers, administration, and outside companies.
- 2014–2020 **Ultracold Atom Researcher**, *University of Illinois at Urbana-Champaign*.
- Joined a new lab and in 9 months built a cold atom quantum simulation experiment, laser trapping and cooling rubidium-87 atoms down to Bose–Einstein condensation. Constructed vacuum systems, laser beamlines, electronics and field coils, etc.
  - Led six quantum simulation projects (with many non-first author works) studying topological and disordered lattice physics: planned experiments, took and analyzed data, simulated expected behavior, communicated with collaborators, and published/presented results.
  - Utilized Mathematica extensively for data analysis, data visualization, numerical simulations, and probing viability of future experiments. Wrote lab code packages from scratch.

## Education

- 2022 **The Data Incubator**, *Data Scientist Certification – Fellowship Program*.
- 2020 **University of Illinois at Urbana-Champaign**, *Ph.D. Physics*, Advisor: Bryce Gadway.
- 2014 **Harvey Mudd College**, *B.S. Physics*, Advisors: Theresa Lynn and Richard Haskell.

## Skills

- Laboratory Laser systems · Optics · RF/microwave electronics · Ultra-high vacuum/cryogenic systems · Machining · SPAM and one/two-qubit gate optimization and calibration · Experimental design · Data analysis · Laser cooling and trapping · Servos · Instrument communication/automation
- Programming Python (numpy, pandas, sklearn) · Mathematica · SQL · Git · Latex · some experience with Labview/MATLAB/C++

## Awards and Honors

- 2022 Team award for "Notable Achievements in 2020-2022" for SPAM work (Quantinuum)
- 2020 John Bardeen Award for outstanding graduate work (Illinois)
- 2020 Drickamer Research Fellowship for excellence in research (Illinois)
- 2019 Participant in 2019 Lindau Nobel Laureate Meeting

## Publications

1. *High fidelity state preparation and measurement of ion hyperfine qubits with  $I > 1/2$*   
**Fangzhao Alex An**, Anthony Ransford, Andrew Schaffer, Lucas R. Sletten, John Gaebler, James Hostetter, and Grahame Vittorini  
Accepted in *Phys. Rev. Lett.* [[arXiv:2203.01920](#)]
2. *Nonlinear dynamics in a synthetic momentum-state lattice*  
**Fangzhao Alex An**, Bhuvanesh Sundar, Junpeng Hou, Xi-Wang Luo, Eric J. Meier, Chuanwei Zhang, Kaden R.A. Hazzard, and Bryce Gadway  
*Phys. Rev. Lett.* **127**, 130401 (2021). [[arXiv:2105.04429](#)]
3. *Interactions and mobility edges: Observing the generalized Aubry-André model*  
**Fangzhao Alex An**, Karmela Padavić, Eric J. Meier, Suraj Hegde, Sriram Ganeshan, J. H. Pixley, Smitha Vishveshwara, and Bryce Gadway  
*Phys. Rev. Lett.* **126**, 040603 (2021). [[arXiv:2007.01393](#)]
4. *The cold atom toolbox in momentum space*  
**Fangzhao Alex An**  
UIUC Ph.D. Thesis (2020).
5. *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:1705.06714](#)]
6. *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:1811.06046](#)]
7. *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:1802.02109](#)]
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:1705.09268](#)]
9. *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:1708.01237](#)]
10. *Diffusive and arrested transport of atoms under tailored disorder*  
**Fangzhao Alex An**, Eric J. Meier, and Bryce Gadway  
*Nat. Commun.* **8**, 325 (2017). [[arXiv:1701.07493](#)]
11. *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:1609.09467](#)]
12. *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:1607.02811](#)]

13. *Atom optics simulator of lattice transport phenomena*  
Eric J. Meier, **Fangzhao Alex An**, and Bryce Gadway  
[Phys. Rev. A \*\*93\*\*, 051602\(R\) \(2016\)](#). [[arXiv:1601.05785](#)]
14. *Experimental Realization of Slowly Rotating Modes of Light*  
**Fangzhao A. An**  
[HMC Senior Thesis \(2014\)](#).
15. *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 \(2014\)](#).