Adam Shaw

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Education

California Institute of Technology Oct 2018 - Apr 2024
Ph.D. Physics, advised by Manuel Endres
Minor Quantum Science and Engineering

Harvey Mudd College, Highest Distinction, GPA: 3.86/4.00 Sep 2014 - May 2018
B.S. Physics Major GPA: 3.96/4.00

Academic Employment

Stanford University Sep 2024 - Present
Stanford Science Postdoctoral Fellow and Urbanek-Chodorow Postdoctoral Fellow, Simon Group

Selected invited talks

[1] Digital and analog quantum science with tweezer arrays. *DAMOP*, 2024

[2] Using chaos to characterize a programmable analog quantum simulator. *Simon's Institute*, 2024

[3] Dynamics and applications of a highly entangled analog quantum simulator. *Google Quantum AI*, 2024

[4] Benchmarking large scale quantum devices. *Physics of Quantum Electronics (Snowbird)*, 2024

[5] Fingerprints of randomness on a 60-atom quantum simulator. *Quantum Creator's Prize Symposium*, 2023

Selected awards and honors

· Stanford Science Postdoctoral Fellowship; *Stanford University* 2024-
· Urbanek-Chodorow Postdoctoral Fellowship; *Stanford University* 2024-
· Attendance at the Lindau Nobel Laureate Meeting in Physics; *Lindau* 2024
· Quantum Creator's Prize; *University of Chicago* 2023
· James A. Cullen Memorial Prize in Physics; *Caltech* 2023
· Eddleman Graduate Fellowship; *Caltech* 2021
· Thomas Brown Award for Outstanding Senior Physics Research; *Harvey Mudd* 2018

Publications

Selected publications by journal: 3x Nature, 2x Nature Physics, 2x PRL, 1x PRX, 1x PRXQ, 1x PRM

First author publications

[1] **AL Shaw**†, DK Mark†, J Choi, R Finkelstein, P Scholl, S Choi, M Endres. Universal fluctuations and noise learning from Hilbert-space ergodicity. In submission at *Science*, arXiv:2403.11971, 2024

[2] **AL Shaw**†, P Scholl†, R Finkelstein†, RBS Tsai, J Choi, M Endres. Erasure-cooling, control, and hyper-entanglement of motion in atom arrays. In revision at *Science*, arXiv:2311.15580, 2023

[3] **AL Shaw**† **(corresponding author)**, Z Chen†, J Choi†, DK Mark†, P Scholl, R Finkelstein, A Elben, S Choi, M Endres. Benchmarking highly entangled states on a 60-atom analog quantum simulator. *Nature* 628, 2024

[4] **AL Shaw**†, R Finkelstein†, RBS Tsai, P Scholl, TH Yoon, J Choi, M Endres. Multi-ensemble metrology by programming local rotations with atom movements. *Nature Physics* 20, 2024

[5] P Scholl†, **AL Shaw**† **(co-first author)**, RBS Tsai, R Finkelstein, J Choi, M Endres. Erasure conversion in a high-fidelity Rydberg quantum simulator. *Nature* 622, 2023

[6] **AL Shaw**, P Scholl, R Finkelstein, IS Madjarov, B Grinkemeyer, M Endres. Dark-state enhanced loading of an optical tweezer array. *Phys Rev Lett* 130, 2023

[7] J Choi†, **AL Shaw**† **(co-first author)**, IS Madjarov, X Xie, R Finkelstein, JP Covey, JS Cotler, DK Mark, HY Huang, A Kale, H Pichler, FGSL Brandão, S Choi, M Endres. Preparing random states and benchmarking with many-body quantum chaos. *Nature* 613, 2023

Other publications

[8] DK Mark, FM Surace, A Elben, **AL Shaw**, J Choi, G Refeal, M Endres, S Choi. A maximum entropy principle in deep thermalization and Hilbert-space ergodicity. In submission at *PRX*, arXiv:2403.11970, 2024

[9] R Finkelstein†, RBS Tsai†, X Sun, P Scholl, S Direkci, T Gefen, J Choi, **AL Shaw**, M Endres. Universal quantum operations and ancilla-based readout for tweezer clocks. In submission at *Nature*, arXiv:2402.16220, 2024

[10] DK Mark, J Choi, **AL Shaw**, M Endres, S Choi. Benchmarking quantum simulators using ergodic quantum dynamics. *Phys Rev Lett* 131, 2023

[11] JS Cotler†, DK Mark†, HY Huang†, F Hernandez, J Choi, **AL Shaw**, M Endres, S Choi. Emergent quantum state designs from individual many-body wave functions. *Phys Rev X Quantum* 4, 2023

[12] A Soper, **AL Shaw**, PLJ Conway, GS Pomrehn, M Ferry, L Bassman, A Pribram-Jones, KJ Laws. Assessing MgSc(rare earth) ternary phase stability via constituent binary cluster expansions. *Comp Mat Sci* 207, 2022

[13] E Hwang, E Cuddy, J Lin, JL Kaufman, **AL Shaw**, PLJ Conway, A Pribram-Jones, KJ Laws, L Bassman. Predicting ductility in quaternary-like alloys. *Phys Rev Mat* 5, 2021

[14] IS Madjarov†, JP Covey†, **AL Shaw**, J Choi, A Kale, A Cooper, H Pichler, V Schkolnik, JR Williams, M Endres. High-fidelity entanglement and detection of alkaline-earth Rydberg atoms. *Nature Physics* 16, 2020

[15] IS Madjarov, A Cooper, **AL Shaw**, JP Covey, V Schkolnik, TH Yoon, JR Williams, M Endres. An atomic-array optical clock with single-atom readout. *Phys Rev X* 9, 2019

[16] PLJ Conway, **AL Shaw**, L Bassman, M Ferry, KJ Laws. Stabilisation of disordered bcc phases in magnesium-rare earth alloys. *Mag Tech* 1, 2017

Invited and contributed talks

[1] **(Invited)** Digital and analog quantum science with tweezer arrays. *DAMOP*, 2024

[2] **(Invited)** Using chaos to characterize a programmable analog quantum simulator. *Simon's Institute*, 2024

[3] **(Invited)** Benchmarking large scale quantum devices. *Google Quantum AI*, 2024

[4] **(Invited)** Benchmarking large scale quantum devices. *Physics of Quantum Electronics (Snowbird)*, 2024

[5] **(Invited)** Approaching the frontier of analog quantum advantage. *QuEra Computing*, 2023

[6] **(Invited)** Fingerprints of randomness on a 60-atom quantum simulator. *Quantum Creator's Prize Symposium*, 2023

[7] Experimentally quantifying the boundary between classical and quantum advantage. *DAMOP*, 2023

[8] **(Invited)** Physics from the bottom: One atom at a time. *Harvey Mudd College physics colloquium*, 2023

[9] Improving the optical tweezer platform with atomic dark states. *Quantum systems accelerator colloquium*, 2023

[10] **(Invited)** Benchmarking an analog quantum system beyond the exact simulation threshold. *Challenge Institute for Quantum Computation annual meeting*, 2022

[11] High-fidelity quantum science with Rydberg atom arrays. *Institute for Quantum Information and Matter colloquium*, 2022

[12] Emergent randomness from many-body quantum chaos. *DAMOP*, 2021

Awards and Honors

· Stanford Science Postdoctoral Fellowship; *Stanford University* 2024-
· Urbanek-Chodorow Postdoctoral Fellowship; *Stanford University* 2024-
· Attendance at the Lindau Nobel Laureate Meeting in Physics; *Lindau* 2024
· Everhart Lecture, supporting; *Caltech* 2024
· Quantum Creator's Prize; *University of Chicago* 2023
· James A. Cullen Memorial Prize in Physics; *Caltech* 2023
· Finalist; Three Minute Thesis competition; *Caltech* 2023
· Eddleman Graduate Fellowship; *Caltech* 2021
· Applied Physics Research Fellowship; *Caltech* 2018-2019
· Thomas Brown Award for Outstanding Senior Physics Research; *Harvey Mudd* 2018
· Departmental High Honors; *Harvey Mudd* 2018
· Honorable Mention; *NSF Graduate Research Fellowship* 2018
· Best undergraduate poster; *The Metals, Minerals, and Materials Conference* 2017/2018
· Laspa Fellowship; *Harvey Mudd* 2016-2018
· First place; *Google Games Irvine* 2016/2017
· Dean's List; *Harvey Mudd* 2014-2018

Previous research experience

Experimental quantum physics Oct 2018 - Present
Caltech, advised by Manuel Endres
Learning, verifying, and erasing errors with a chaotic and highly entangled programmable quantum simulator

Computational materials physics Jan 2016 - Aug 2019
Harvey Mudd, advised by Lori Bassman
Phase stability in rare-earth magnesium alloys

Experimental condensed matter physics Aug 2017 - May 2019
Harvey Mudd, advised by Nicholas Breznay
Superconductivity, localization, and charge-ordering in thin metal bilayers

Computational condensed matter physics May 2017 - Sep 2017
Los Alamos National Lab, advised by Filip Ronning
Magnetic susceptibilities of strongly-correlated heavy-fermion superconductors

Controls engineering Aug 2015 - May 2017
Harvey Mudd, advised by Chris Clark
Sensor fusion and real-time control of Hyperloop dynamics

Computer science May 2015 - Nov 2015
Harvey Mudd, advised by Julie Medero
Understanding computational linguistic hardness with tactile feedback