ALICIA J KOLLÁR
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University of Maryland
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APPOINTMENTS

University of Maryland, Physics and JQI, Assistant Professor	2019-Present
University of Maryland, ECE, Affiliate Assistant Professor	2019-Present

EDUCATION

Princeton University, Electrical Engineering, Postdoctoral Scholar	2017-2019
Stanford University, Applied Physics, Postdoctoral Scholar	2016-2017
Stanford University, Ph.D., Applied Physics.	2010-2016
Princeton University, B.A. Physics	2006-2010

FELLOWSHIPS AND AWARDS

Sloan Research Fellow	2022
Airforce Office of Scientific Research Young Investigator Prize	2021
National Science Foundation CAREER Award	2021
Princeton Materials Science Postdoctoral Fellowship	2017-2019
National Defense Science and Engineering Fellowship	2012-2015

RESEARCH INTERESTS

Quantum Simulation
Superconducting Circuits
Circuit and Cavity QED
Many-Body Physics with Photons
Open and Driven-Dissipative Systems
Graph Theory and Applied Mathematics

ADVISORS

Andrew Houck (Postdoc)
Benjamin Lev (Ph.D.)

COLLABORATORS

Peter Sarnak (Princeton University, Mathematics)
Steven Flammia (Amazon Web Systems)
Alexey Gorshkov (JQI, NIST Gaithersberg)
Fan Wei (Institute for Advanced Study, Mathematics)
Andrew Houck (Princeton University, Electrical Engineering)
Igor Boettcher (University of Alberta, Physics)
Kanupriya Sinha (Arizona State, Mechanical Engineering)
Adrian Chapman (Oxford)
Gaurav Bahl (UIUC, Mechanical Engineering)

STUDENTS

Martin Ritter
Maya Amouzegar
Kellen O'Brien
Jeffrey Wack (undergraduate)
Theo Gifford (undergraduate)

PUBLICATIONS

16) A. J. Kollár, P. Sarnak, F. Wei, *Spectral Rigidity for Planar Cubic Graphs with Constrained Faces*, In Preparation (2021).

15) A. Chapman, S. T. Flammia, A. J. Kollár, *Free-Fermion Subsystem Codes,* arXiv:2201.07254 (2022), PRX Quantum (in press).

14) D. M. Long, P. J. D. Crowley, A. J. Kollár, A. Chandran, *Boosting the Quantum State of a Cavity with Floquet Driving,* Phys. Rev. Lett., **128**, 183602 (2022), arXiv:2109.11553 (2021).

13) I. Boettcher, A. V. Gorshkov, A. J. Kollár, J. Maciejko, S. Rayan, R. Thomale, *Crystallography of Hyperbolic Lattices,* Phys. Rev. B, **105**, 125118 Editor's Suggestion (2022), arXiv:2105:01087 (2021).

12) P. Bienias, R. Belyansky, I. Boettcher, A. J. Kollár, A. V. Gorshkov, *Circuit Quantum Electrodynamics in Hyperbolic Space: From Photon Bound State to Frustrated Spin Models,* Phys. Rev. Lett., **128**, 013601 (2022), arXiv:2105.06490 (2021).

11) A. J. Kollár, P. Sarnak, *Gap Sets for the Spectra of Cubic Graphs*, Communication of the American Mathematical Society, **1**, 1 (2021), arXiv:2005.05379 (2020).

10) I. Carusotto, A. A. Houck, A. J. Kollár, P. Roushan, D. I. Schuster, J. Simon, *Photonic Materials in Circuit Quantum Electrodynamics,* Nature Physics **16**, 268-279 (2020).

9) E. Altman, K.R, Brown, G. Carleo, L. D. Carr, E. Demler, C. Chin, B. DeMarco, S. E. Economou, M. A. Eriksson, K. C. Fu, M. Greiner, K. R. A. Hazzard, R. G. Hulet, A. J. Kollár, B. L. Lev, M .D. Lukin, R. Ma, X. Mi, S. Misra, C. Monroe, K. Murch, Z. Nazario, K. Ni, A. C. Potter, P. Roushan, M. Saffman, M. Schleier-Smith, I. Siddiqi, R. Simmonds, M. Singh, I. B. Spielman, K. Temme, D. S. Weiss, J. Vockovic, V. Vuletic, J. Ye, M. Zwierlein, *Quantum Simulators: Architectures and Opportunities,* arXiv:1912.0638 (2019), Physical Review X Quantum **2**, 017003 (2021).

8) I. Boettcher, P. Bienias, R. Belyansky, A.J. Kollár, A.V. Gorshkov, *Quantum Simulation of Hyperbolic Space with Circuit Quantum Electrodynamics,* Physical Review A, **102** 032208 (2020, Editor's Suggestion, Featured in Physics)

7) A. J. Kollár, M. Fitzpatrick, P. Sarnak, A.A. Houck, *Line-Graph Lattices: Euclidean and Non-Euclidean Flat Bands and Implementations in Circuit QED, Communications in Mathematical Physics* **44**, 1601 (2020), arXiv:1902.02794v1 (2019).

6) A. J. Kollár, M. Fitzpatrick, A. A. Houck, *Hyperbolic Lattices in Circuit Quantum Electrodynamics, Nature* **571**, 45-49 (2019), arXiv:1802.09549.

5) V. D. Vaidya, Y. Guo, R. M. Kroeze, K. E. Ballantine, A. J. Kollár, J. Keeling, B. L. Lev, *Tunable-range, photon-mediated atomic interactions in multimode cavity QED, Physical Review X, **8**,* 011002 (2018), arXiv:1708.08933.

4) F. Yang, A. J. Kollár, S. F. Taylor, R. W. Turner, B. L. Lev, *A Scanning Quantum Cryogenic Atom Microscope, Physical Review Applied,* **7,** 034026 (2017), arXiv:1608.06922.

3) A. J. Kollár, A. T. Papageorge, K. Baumann, V. D. Vaidya, Y. Guo, J. Keeling, B. L. Lev, *Supermode-Density-Wave-Polariton Condensation, Nature Communications,* **8,** 14386 (2017), arXiv:1606.04127.

2) A. T. Papageorge, A. J. Kollár, B. L. Lev, *Coupling to Modes of a Near-Confocal Optical Resonator using a Digital Light Modulator, Optics Express,* **24,** 11447 (2016), arXiv:1603.06900.

1) A. J. Kollár, A. T. Papageorge, K. Baumann, M. A. Armen, B. L. Lev, *An adjustable-length cavity and Bose-Einstein condensate apparatus for multimode cavity QED, New Journal of Physics,* **17,** 043012 (2015), arXiv:1407.3842.

INVITED TALKS

20) *Band Engineering for Quantum Simulation in Circuit QED*
Heraeus Workshop: Lattice-Based Quantum Simulation, Dec 2021

20) *Artificial Photonic Materials in Circuit QED*
ICFO-Weizmann Summer School on the Frontiers of Light, July 2021

19) *Engineering Qubit-Qubit Interactions in Circuit QED Lattices*
SPICE Workshop on Non-Equilibrium Physics, May 2021

18) *Artificial Photonic Materials in Circuit QED*
APS DAMOP Graduate Student Symposium, May 2021

17) *Artificial Photonic Materials: Coplanar Waveguide Lattices.*
APS March Meeting Tutorials, Mar 2021

16) *Band Engineering for Quantum Simulation in Circuit QED*

Many-Body Physics in Open Quantum Systems Workshop, Jan 2021

15) *Hyperbolic Lattices in Circuit QED*
APS March Meeting, Mar 2020

14) *Band Engineering for Quantum Simulation in Circuit QED*
Southwest Quantum Information and Technology Workshop, Feb 2020

13) *Band Engineering for Quantum Simulation in Circuit QED*
IARPA LogiQ Technical Exchange Meeting, Jan 2020

12) *Band Engineering for Quantum Simulation in Circuit QED*
Gordon Research Conference on Quantum Control of Light and Matter, August 2019

11) *Band Engineering for Quantum Simulation in Circuit QED*
DAMOP, Milwaukee, May 2019

10) *Hyperbolic and Flat-Band Lattices in Circuit QED*
The Dynamics of Quantum Information KITP, September 2018

9) *Hyperbolic and Flat-Band Lattices in Circuit QED*
Gordon Research Conference on Quantum Science, Stonehill College, July 2018

8) *Hyperbolic and Flat-Band Lattices in Circuit QED*
Dynamics and Dissipation in Quantum Simulation Workshop, Stanford University, July 2018

7) *Quantum Simulation and Lattices in Circuit QED*
Workshop on 2D Quantum Metamaterials, NIST, Gaithersberg, April 2018

6) *Self-organization in multimode cavity QED and magnetometry with 1D Bose-Einstein condensates*
Quantum Innovators, Waterloo Canada, October 2016

5) *Supermode-density-wave-polariton condensation in a multimode cavity QED-BEC system*
Stanford Photonics Research Center Symposium, Stanford, September 2016

4) *Supermode-polariton condensation in a multimode cavity QED-BEC system*
International Conference on Quantum Optics, Obergurgl Austria, February 2016

3) *Beyond mean-field physics in multimode cavity QED*
POLATOM, Bad Honnef Germany, June, 2015

2) *Exploring strongly correlated matter with multimode cavity QED*
Workshop on the Physics of Quantum Electronics, Snowbird Utah, January 2012

1) *Exploring strongly correlated matter with multimode cavity QED*
Stanford Photonics Research Center Symposium, Stanford, September 2011

SEMINARS AND COLLOQUIA

11) *Circuit QED Lattices*
Condensed Matter Seminar, Columbia University, Mar 2022

10) *Band Engineering for Quantum Simulation in Circuit QED*
Condensed Matter Seminar, Niels Bohr Institute, Oct 2021

9) *Band Engineering for Quantum Simulation in Circuit QED*
IBM Quiskit Seminar Series, July 2021

8) *Band Engineering for Quantum Simulation in Circuit QED*
Colloquium, Dept. of Physics, University of Trento, Apr 2021

7) *Circuit QED Lattices: Synthetic Quantum Systems on Line Graphs*
Tutte Colloquium, Dept. of Combinatorics and Optimization, University of Waterloo, Apr 2021

6) *Band Engineering for Quantum Simulation in Circuit QED*
IQUIST Seminar, University of Illinois Urbana-Champaign, Oct 2020

5) *Band Engineering for Quantum Simulation in Circuit QED*
Condensed Matter Seminar, University of Pittsburgh, October 2019

5) *Hyperbolic and Flat-Band Lattices in Circuit QED*
Condensed Matter Seminar, City University of New York, December 2018

4) *Hyperbolic and Flat-Band Lattices in Circuit QED*
AMO/QI Seminar, University of California Berkeley, October 2018

3) *Hyperbolic and Flat-Band Lattices in Circuit QED*
Seminar, University of Massachusetts, Amherst, March 2018

2) *Hyperbolic and Flat-Band Lattices in Circuit QED*
JQI Seminar, University of Maryland, February 2018

1) *Supermode-polariton condensation in a multimode cavity QED-BEC system*
Applied Physics Optics and Electronics Seminar, Stanford, January 2016

SYNERGISTIC AND OUTREACH ACTIVITIES:

Member: APS DAMOP Executive Committee and Nominating Committee 2022-2024

Founder: UMD Undergraduate Pre-Colloquium Tutorial Program

Board member of Virtual AMO Seminar (VAMOS) 2020-2021

Organizer of Princeton Quantum Group Meeting student seminar series 2018-2019

Organizer of Aspen Winter Conference “Many-body Cavity QED” 2021

Undergraduate senior thesis and summer research supervisor

Reviewer for Nature Communications, Optics Letters, Physical Review X, Physical Review Letters, Physical Review A, New Journal of Physics, Nature

Lecturer for Phys 170 Professional Physics Seminar introducing college freshman to modern physics research topics.

Undergraduate research poster contest judge

Chair of PhD Defense Committee (Ana Valdés-Curiel, supervisor: Dr. Ian Spielman)

Member: Graduate Qualifying Exam and Education Requirements Committee

Member: Physics Department Climate Committee 2020-2021

Early-career representative to the APS DAMOP executive committee 2022-2024