Curriculum Vitae - Shimon Kolkowitz

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Research Appointments

University of Wisconsin - Madison

- Assistant Professor - Department of Physics, 2018 - Present.
- Faculty Affiliate - Department of Engineering Physics, 2019 - Present

JILA, NIST, and University of Colorado, Boulder

- National Research Council (NRC) postdoctoral research associate, 2015 - 2017.

Education

- Ph.D. Physics, Harvard University, 2015.
- A.M. Physics, Harvard University, 2011.
- B.S. Physics, *with distinction*, Stanford University, 2008.

Honors and Awards

- Packard Fellowship for Science and Engineering, 2019.
- Gordon and Betty Moore Foundation Lectureship Award, 2019.
- National Research Council (NRC) Postdoctoral Fellowship, 2015 - 2017.
- Outstanding Presentation Award, NIST Boulder Laboratories Postdoctoral Poster Symposium, 2016.
- National Science Foundation Graduate Research Fellowship, 2013 - 2015.
- National Defense Science and Engineering Graduate Fellowship, 2010 - 2013.

Journal publications

- S. Kimmel and S. Kolkowitz, "No-go bounds for quantum seals," accepted for publication in *Physical Review A*, pre-print available at *arXiv:1802.10007* (2019).
- S.L. Bromley, S. Kolkowitz, T. Bothwell, D. Kedar, A. Safavi-Naini, M.L. Wall, C. Saloman, A.M. Rey, and J. Ye, "Dynamics of interacting fermions under spin-orbit coupling in an optical lattice clock," *Nature Physics* **14**, 399-404 (2018).
- S. Kolkowitz, S.L. Bromley, T. Bothwell, M.L. Wall, G.E. Marti, A.P. Koller, X. Zhang, A.M. Rey, and J. Ye, "Spin-orbit coupled fermions in an optical lattice clock," *Nature* **542**, 66-70 (2017).

- S. Kolkowitz, I. Pikovski, N. Langellier, M.D. Lukin, R.L. Walsworth, and J. Ye, "Gravitational wave detection with optical lattice atomic clocks," *Physical Review D* **94**, 124043 (2016).
- S. Kolkowitz, A. Safira, A.A. High, R.C. Devlin, S. Choi, Q.P. Unterreithmeier, D. Patterson, A.S. Zibrov, V.E. Manucharyan, H. Park, and M.D. Lukin, "Probing Johnson noise and ballistic transport in normal metals with a single spin qubit," *Science* **347**, no. 6226 (2015).
  - This work was highlighted in: L.P. McGuinness and F. Jelezko, "Look but don't touch the metals," *Science* **347**, no. 6226 (2015). Perspectives section.
- S. Kolkowitz, Q.P. Unterreithmeier, S.D. Bennett, and M.D. Lukin, "Sensing distant nuclear spins with a single electron spin," *Physical Review Letters* **109**, 137601 (2012).
  - This work was highlighted in: "Exercising spin control," *Science* **338**, Editors' Choice section (2012).
- S. Kolkowitz, A.C.B. Jayich, Q.P. Unterreithmeier, S.D. Bennett, P. Rabl, J.G.E. Harris, and M.D. Lukin, "Coherent sensing of a mechanical resonator with a single-spin qubit," *Science* **335**, no. 6076 (2012).
  - This work was highlighted in: P.A. Treutlein, "Single spin feels the vibrations," *Science* **335**, no. 6076 (2012). Perspectives section.
- S.D. Bennett, S. Kolkowitz, Q.P. Unterreithmeier, P. Rabl, A.C.B. Jayich, J.G.E. Harris, and M.D. Lukin, "Measuring mechanical motion with a single spin," *New Journal of Physics* **14**, 125004 (2012).
- P. Rabl, S. Kolkowitz, F.H.L. Koppens, J.G.E. Harris, P. Zoller, and M.D. Lukin, "A quantum spin transducer based on nanoelectromechanical resonator arrays," *Nature Physics* **6**, 602-608 (2010).
- P. Fierlinger, R. DeVoe, B. Flatt, G. Gratta, M. Green, S. Kolkowitz, F. Leport, M. Montero Diez, R. Neilson, K. O'Sullivan, A. Pocar, and J. Wodin, "A microfabricated sensor for thin dielectric layers," *Review of Scientific Instruments* **79**, 045101 (2008).
- D.S. Leonard, *et al.* (EXO Collab.), "Systematic study of trace radioactive impurities in candidate construction materials for EXO-200," *Nuclear Instruments and Methods in Physics Research Sect. A* **591**, 490 (2008).
- R. Abramitzky, L. Einav, S. Kolkowitz, and R. Mill, "On the optimality of line call challenges in professional tennis," *International Economic Review* **53**, 939-964 (2012).

Pre-prints currently under review

- A. Gardill, M.C. Cambria, and S. Kolkowitz, "Fast relaxation on magnetic-dipole-forbidden spin transitions of nitrogen-vacancy centers in nanodiamonds," under review at *Physical Review Letters*, pre-print available at *arXiv:1910.10813* (2019).

Books

- S. Kolkowitz and J. Ye, "Precision Timekeeping: Optical Atomic Clocks," in Handbook of Laser Technology & Applications, 2nd Ed., in press, C. Guo, Ed., CRC Press, London (2020). (Invited)

Patents

- S. Kolkowitz, A. Safira, A.A. High, R.C. Devlin, S. Choi, Q.P. Unterreithmeier, D. Patterson, A.S. Zibrov, V.E. Manucharyan, H. Park, and M.D. Lukin, "A sensor for measurements using Johnson noise in materials." United States Patent #10197497, published 2/5/2019.

Professional Activities

- NSF Reviewer, 2019.
- DOE Reviewer, 2019.
- NWO Domain Science Reviewer, 2019.
- Panelist for NDSEG Fellowships, 2017 and 2018 application periods.
- Referee for journals including *Physical Review Letters, Physical Review A, Physical Review B, Physical Review Applied, New Journal of Physics, Journal of Optics, Nature Communications, Review of Scientific Instruments, Journal of Micromechanics and Microengineering,* and *Nano Letters*.
- Madison Teaching and Learning Excellence Fellow.
- Volunteer organizer and presenter for the University of Wisconsin - Madison "Wonders of Physics" program.

Research funding

- PI on active grants from ARO, DOE, David and Lucile Packard Foundation, NIST, and Wisconsin Alumni Research Foundation (WARF).
- Lead-PI on $4M DOE Materials and Chemical Sciences Research for Quantum Information Science grant.

Invited talks

- ITAMP Workshop: "Laboratory Cosmology: AMO Physics Techniques and Applications," Harvard, MA - Sep. 16th, 2019
- Gordon and Betty Moore Foundation Lecture, Stevens Institute of Technology, NJ - July 10th, 2019
- Engineering Physics Seminar, University of Wisconsin-Madison, WI - May. 7th, 2019
- Physical Chemistry Seminar, University of Wisconsin-Madison, WI - March. 5th, 2019
- Physics colloquium, Lawrence University, WI - Feb. 19th, 2019
- SPIE Photonics West Invited Talk, San Francisco, CA - Feb 6th, 2019
- CPAD Instrumentation Frontier Workshop 2018, Brown University, RI - Dec. 9th, 2018
- Midwest Cold Atom Workshop, University of Illinois Urbana-Champaign, IL - Nov. 10th, 2018
- Chaos and Complex Systems Seminar, University of Wisconsin-Madison, WI - Sep. 11th, 2018
- AMO/QI seminar, University of Illinois Urbana-Champaign, IL - Mar. 28th, 2018
- Physics Department colloquium, University of Wisconsin-Madison, WI - Feb. 23rd, 2018
- SRitp workshop: "Beyond Standard Model Physics in direct, indirect and tabletop experiments," Weizmann Institute, Israel - Nov. 13th, 2017
- AMO seminar, UC Berkeley, CA - Oct. 4th, 2017

- College of Optical Sciences colloquium, University of Arizona, AZ - Feb. 2nd, 2017
- Atomic Physics Seminar, University of Wisconsin-Madison, WI - Jan. 24th, 2017
- Special Physics colloquium, UC Santa Barbara, CA - Jan. 5th, 2017
- CNAM colloquium, University of Maryland, MD - Oct. 6th, 2016
- ITAMP workshop: "Laboratory Cosmology: AMO Physics Techniques and Applications for Cosmological Phenomena," Harvard, MA - Sep. 12th, 2016
- NASA Fundamental Physics workshop, Dana Point, CA - Apr. 11th, 2016
- ITAMP weekly seminar, Harvard, MA - Mar. 31st, 2016
- Winter school workshop: "Advanced atomic sources and extreme cooling of atoms and molecules: techniques and applications," Les Houches, France - Jan. 27th, 2016
- Condensed Matter and Biophysics seminar, Washington University in St. Louis, MO - Dec. 1st, 2014
- AMO seminar, UC Berkeley, CA - Nov. 25th, 2014
- Boston Area Carbon Nanoscience seminar, MIT, MA - Oct. 24th, 2014
- Atomic, Bio, and Condensed Matter seminar, University of Washington, WA - Oct. 16th, 2014
- Center for Ultracold Atoms triple feature seminar, Harvard-MIT, MA - Sep. 30th, 2014
- California NanoSystems Institute seminar, UC Santa Barbara, CA - June 1st, 2012
- ITAMP workshop: "Optomechanics and Macroscopic Cooling," Harvard, MA - Feb. 7th, 2011
- Condensed Matter special seminar, Weizmann Institute, Israel - Jan. 31st, 2011

Public outreach lectures

- Business Engagement Day on Campus RED Talk, University of Wisconsin - Madison, WI - Aug. 15th, 2019
- Science on Tap public talk, Madison, WI - May 1st, 2019
- Science Hall colloquium, Lawrence University, WI - Feb. 18th, 2019
- Madison Technical Club lecture, Madison, WI - Feb. 13th
- Technology Advisors Circle seminar, Benhamou Global Ventures, Palo Alto, CA - Feb. 5th, 2019
- Contributed talk, "Color: Pixels, Palettes, and Perception Symposium," University of Wisconsin - Madison, WI - Mar. 3rd, 2018