

University of Colorado, Boulder
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PERSONAL INFORMATION

Born: 1979
Citizenship: United States

EDUCATION

Dec 2006	Ph.D. Physics, University of Colorado, Boulder, CO
June 2001	B.A. Physics, Summa Cum Laude, Lawrence University, WI
June 1997	Duluth East High School, Duluth, MN

APPOINTMENTS

Present	Baur-SPIE Chair of Physics in Optical Physics and Photonics, University of Colorado, Boulder
Sept 2016 - Aug 2021	Associate Professor of Physics, University of Colorado, Boulder
Jan 2010 - Aug 2016	Assistant Professor of Physics, University of Colorado, Boulder
2007 - 2009	Millikan Postdoctoral Fellow, California Institute of Technology
2006 - 2007	Postdoctoral Researcher, JILA, Boulder, CO
2001 - 2006	Graduate Research Assistant, JILA, Boulder

AWARDS

Cottrell Scholars Frontiers in Research Excellence and Discovery Award, 2020
Manne Siegbahn Memorial Lecture, 2020
Alexander Cruickshank Lecturer Quantum Sciences GRC, 2018
Outstanding Referee of American Physical Society Journals, 2017
Fellow, American Physical Society, 2017
CO-Labs Colorado Governor's Award for high-impact Research, 2016
University of Colorado Provost's Faculty achievement award, 2014
Cottrell Scholars Award, Research Corporation, 2014
Presidential Early Career Award for Scientists and Engineers (PECASE), 2012
Packard Fellowship in Science and Engineering, 2011
Clare Boothe Luce Assistant Professorship in Physics, University of Colorado, 2010-2015
Millikan Prize Postdoctoral Fellowship, California Institute of Technology, 2007-2009
Hertz Foundation doctoral thesis prize winner, 2007
APS Division of AMO Physics (DAMOP) thesis prize winner, 2007
Hertz Foundation Fellowship for graduate studies in the physical sciences, 2001-2006
National Science Foundation Graduate Fellowship, declined 2001
Barry M. Goldwater scholarship in science and mathematics, 2000-2001
Clare Boothe Luce scholarship, 1998-2000

PUBLICATIONS

Preprints:

P. T. Grochowski, H. Pichler, C. A. Regal, O. Romero-Isart, Quantum control of continuous systems via nonharmonic potential modulation, arXiv:2311.16819 (2023).

An accurate vector optically pumped magnetometer with microwave-driven Rabi frequency measurements, Christopher Kiehl, Thanmay S. Menon, Svenja Knappe, Tobias Thiele, Cindy A. Regal, arXiv:2409.09885 (2024)

Quantifying Light-assisted Collisions in Optical Tweezers Across the Hyperfine Spectrum, Steven K. Pampel, Matteo Marinelli, Mark O. Brown, José P. D'Incao, Cindy A. Regal, arXiv:2408.15359 (2024).

A high optical access cryogenic system for Rydberg atom arrays with a 3000-second trap lifetime, Zhenpu Zhang, Ting-Wei Hsu, Ting You Tan, Daniel H. Slichter, Adam M. Kaufman, Matteo Marinelli, Cindy A. Regal, arXiv:2412.09780 (2024).

Refereed articles:

62. C. Kiehl, T. S. Menon, D. P. Hewatt, S. Knappe, T. Thiele, and C. A. Regal, Correcting heading errors in optically pumped magnetometers through microwave interrogation, *Physical Review Applied* **22**, 014005 (2024).
61. S. Mittal, K. Adachi, N. Frattini, M. Urmeý, S.-X. Lin, A. Emser, C. Metzger, L. Talamo, S. Dickson, D. Carlson, S. Papp, C. A. Regal, and K. W. Lehnert, Annealing reduces Si₃N₄ microwave-frequency dielectric loss in superconducting resonators, *Phys. Rev. Applied* **21**, 054044 (2024).
60. R. Shaniv, C. Reetz, C. A. Regal, Direct measurement of a spatially varying thermal bath using Brownian motion, *Physical Review Research* **5**, 043121 (2023).
59. R. Shaniv, S. K. Keshava, C. Reetz, and C. A. Regal, Understanding the quality factor of mass-loaded tensioned resonators, *Phys. Rev. Applied* **19**, L031006 (2023).
58. M. O. Brown, S. R. Muleady, W. J. Dworschack, R. J. Lewis-Swan, A. M. Rey, O. Romero-Isart, C. A. Regal, Time-of-flight quantum tomography of an atom in an optical tweezer, *Nature Physics* **19**, 1531 (2023).
57. C. Kiehl, D. Wagner, T.-W. Hsu, S. Knappe, C. A. Regal, T. S. Thiele, Coherence of Rabi oscillations with spin exchange, *Physical Review Research* **5**, L012002 (2023).
56. T.-W. Hsu, W. Zhu, T. S. Thiele, M. O. Brown, S. B. Papp, A. Agrawal, C. A. Regal, Single atom trapping in a metasurface lens optical tweezer, *PRX Quantum* **3**, 030316 (2022).
55. B. M. Brubaker, J. M. Kindem, M. D. Urmeý, S. Mittal, R. D. Delaney, P. S. Burns, M. R. Vissers, K. W. Lehnert, C. A. Regal, Optomechanical ground-state cooling in a continuous and efficient electro-optic transducer, *Phys. Rev. X* **12**, 021062 (2022).
54. R. D. Delaney, M. D. Urmeý, S. Mittal, B. M. Brubaker, J. M. Kindem, P. S. Burns, C. A. Regal, K. W. Lehnert, Superconducting-qubit readout via low-backaction electro-optic transduction, *Nature* **606**, 489 (2022).

53. S. Barzanjeh, A. Xuereb, S. Groeblacher, M. Paternostro, C. A. Regal, and E. M. Weig, Optomechanics for quantum technologies, *Nature Physics* **18**, 15 (2022).
52. Daniel Carney, Gordan Krnjaic, David C Moore, Cindy A Regal, Mechanical quantum sensing in the search for dark matter, *Quantum Science and Technology* **6**, 024002 (2021).
51. C. Reetz, R. Fischer, G.G.T. Assumpção, D.P. McNally, P.S. Burns, J.C. Sankey, C.A. Regal, Analysis of Membrane Phononic Crystals with Wide Band Gaps and Low-Mass Defects, *Phys. Rev. Applied* **14**, 044027 (2019).
50. R. Fischer, D. P. McNally, C. Reetz, G. G. T. Assumpcao, T. R. Knief, Y. Lin, C. A. Regal, Spin detection with a micromechanical trampoline: Towards magnetic resonance microscopy harnessing cavity optomechanics, *New J. Phys.* **21**, 043049 (2019).
49. M. O. Brown, T. Thiele, C. Kiehl, T.-W. Hsu, C.A. Regal, Gray-Molasses Optical-Tweezer Loading: Controlling Collisions for Scaling Atom-Array Assembly, *Phys. Rev. X* **9**, 011057 (2019).
48. T. Thiele, Y. Lin, M.O. Brown, C.A. Regal, Self-Calibrating Vector Atomic Magnetometry through Microwave Polarization Reconstruction, *Phys. Rev. Lett.* **121**, 153202 (2018).
47. E. Munro, A. Asenjo-Garcia, Y. Lin, L.C. Kwek, C.A. Regal, D.E. Chang, Population mixing due to dipole-dipole interactions in a one-dimensional array of multilevel atoms, *Physical Review A* **98**, 033815 (2018).
46. A. P. Higginbotham, P. S. Burns, M. D. Urmey, R.W. Peterson, N. S. Kampel, B. M. Brubaker, G. Smith, K.W. Lehnert, C. A. Regal, Harnessing electro-optic correlations in an efficient mechanical converter, *Nature Physics* **14**, 1038 (2018).
45. B. J. Lester, Y. Lin, M.O. Brown, A.M. Kaufman, R.J. Ball, E. Knill, A.M. Rey, C.A. Regal, Measurement-Based Entanglement of Noninteracting Bosonic Atoms, *Phys. Rev. Lett.* **120**, 193602 (2018).
44. A.M. Kaufman, M.C. Tichy, F. Mintert, A.M. Rey, C.A. Regal, *The Hong–Ou–Mandel Effect With Atoms*, *Advances In Atomic, Molecular, and Optical Physics* **67**, 377 (2018).
43. T. Menke, P.S. Burns, A.P. Higginbotham, N.S. Kampel, R.W. Peterson, K. Cicak, R.W. Simmonds, C.A. Regal, K.W. Lehnert, Reconfigurable re-entrant cavity for wireless coupling to an electro-optomechanical device, *Rev. Sci. Instrum.* **88**, 094701 (2017).
42. N. S. Kampel, R. W. Peterson, R. Fischer, K. Cicak, R. W. Simmonds, K. W. Lehnert, and C. A. Regal, Improving broadband displacement detection with quantum correlations, *Phys. Rev. X* **7**, 021008 (2017).
41. R. W. Peterson, T. P. Purdy, N. S. Kampel, R. W. Andrew, K. W. Lehnert, and C. A. Regal, Laser cooling of a micromechanical membrane to the quantum backaction limit, *Phys. Rev. Lett.* **116**, 063601 (2016).
39. A.M. Kaufman, B.J. Lester, M. Foss-Feig, M.L. Wall, A.M. Rey, C.A. Regal, Entangling two transportable neutral atoms via local spin exchange. *Nature* **527**, 208 (2015).
38. T.P. Purdy, P.L. Yu, N.S. Kampel, R.W. Peterson, K. Cicak, R.W. Simmonds, C.A. Regal, Optomechanical Raman-ratio thermometry. *Phys. Rev. A* **92**, 031802(R) (2015).
37. B. J. Lester, N. Luick, A. M. Kaufman, C. M. Reynolds, and C. A. Regal, Rapid production of uniform arrays of neutral atoms. *Phys. Rev. Lett.* **115**, 073003 (2015).
36. B. J. Lester, A. M. Kaufman, and C. A. Regal, Raman cooling imaging: Detecting single atoms near their ground state of motion. *Phys. Rev. A* **90**, 011804(R) (2014).
35. A. M. Kaufman, B. J. Lester, C. M. Reynolds, M. L. Wall, M. Foss-Feig, K. R. A. Hazzard, A. M. Rey, C. A. Regal, Two-particle quantum interference in tunnel-coupled optical tweezers. *Science* **345**, 306 (2014). [Featured in Science Perspective article]

34. G. D. Cole, P.-L. Yu, C. Gartner, K. Siquans, R. Moghadas Nia, J. Schmole, J. Hoelscher-Obermaier, T. P. Purdy, W. Wiczorek, C. A. Regal, and M. Aspelmeyer, Tensile strained $\text{In}_x\text{Ga}_{1-x}\text{P}$, *Appl. Phys. Lett.* **104**, 201908 (2014).
33. P.-L. Yu, K. Cicak, N. S. Kampel, Y. Tsaturyan, T. P. Purdy, R. W. Simmonds, and C. A. Regal, A phononic bandgap shield for high-Q membrane microresonators, *Appl. Phys. Lett.* **104**, 023510 (2014).
32. R. W. Andrews, R. W. Peterson, T. P. Purdy, K. Cicak, R. W. Simmonds, C. A. Regal, and K. W. Lehnert, Bidirectional and efficient conversion between microwave and optical light, *Nature Phys.* **10**, 321 (2014).
31. T. P. Purdy, P.-L. Yu, R. W. Peterson, N. S. Kampel, and C. A. Regal, Strong optomechanical squeezing of light, *Phys. Rev. X* **3**, 031012 (2013). [Featured as APS Physics Viewpoint]
30. T. P. Purdy, R. W. Peterson, and C. A. Regal, Observation of radiation pressure shot noise on a macroscopic object, *Science* **339**, 801 (2013). [Featured in Science Perspective article]
29. S. A. McGee, D. Meiser, C. A. Regal, K. W. Lehnert, and M. J. Holland, Mechanical resonators for storage and transfer of electrical and optical quantum states, *Phys. Rev. A* **87**, 053818 (2013).
28. A. M. Kaufman, B. J. Lester, and C. A. Regal, Cooling a single atom in an optical tweezer to its quantum ground state, *Phys. Rev. X* **2**, 041014 (2012). [Featured as an APS Physics Synopsis, a Nature Research Highlight, and a Science Magazine Editors' Choice]
27. T. P. Purdy, R. W. Peterson, P.-L. Yu, and C. A. Regal, Cavity optomechanics with Si_3N_4 membranes at cryogenic temperatures, *New J. Phys.* **14**, 115021 (2012).
26. P.-L. Yu, T. P. Purdy, and C. A. Regal, Control of material damping in high-Q membrane microresonators, *Phys. Rev. Lett.* **108**, 083603 (2012).
25. C. A. Regal and K. W. Lehnert, From cavity electromechanics to cavity optomechanics, *J. Phys.: Conf. Ser.* **264**, 012025 (2010).
24. D. E. Chang, C. A. Regal, S. B. Papp, D. J. Wilson, J. Ye, O. Painter, H. J. Kimble, and P. Zoller, Cavity optomechanics using an optically levitated nanosphere, *Proc. Natl. Acad. Sci. USA* **107**, 1005 (2010).
23. D. J. Wilson, C. A. Regal, S. B. Papp, and H. J. Kimble, Cavity optomechanics with stoichiometric SiN films, *Phys. Rev. Lett.* **103**, 207204 (2009).
22. Takao Aoki, A. S. Parkins, D. J. Alton, C. A. Regal, Barak Dayan, E. Ostby, K. J. Vahala, and H. J. Kimble, Efficient routing of single photons by one atom and a microtoroidal cavity, *Phys. Rev. Lett.* **102**, 083601 (2009).
21. J. D. Teufel, J. W. Harlow, C. A. Regal, and K. W. Lehnert, Dynamical backaction of microwave fields on a nanomechanical oscillator, *Phys. Rev. Lett.* **101**, 197203 (2008).
20. J. D. Teufel, C. A. Regal, and K. W. Lehnert, Prospects for cooling nanomechanical motion by coupling to a superconducting microwave resonator, *New J. Phys.* **10**, 095002 (2008).
19. C. A. Regal, J. D. Teufel, and K. W. Lehnert, Measuring nanomechanical motion with a microwave cavity interferometer, *Nature Physics* **4**, 555 (2008).
18. J. T. Stewart, J. P. Gaebler, C. A. Regal, and D. S. Jin, The potential energy of a ^{40}K Fermi gas in the BCS-BEC crossover, *Phys. Rev. Lett.* **97**, 220406 (2006).
17. Q. Chen, C. A. Regal, D. S. Jin, and K. Levin, Finite-temperature momentum distribution of a trapped Fermi gas, *Phys. Rev. A* **74**, 011601 (2006).
16. Q. Chen, C. A. Regal, M. Greiner, D. S. Jin, and K. Levin, Understanding the superfluid phase diagram in trapped Fermi gases, *Phys. Rev. A* **73**, 041601 (2006).

15. C. A. Regal, M. Greiner, S. Giorgini, M. Holland, and D. S. Jin, Momentum distribution of a Fermi gas of atoms in the BCS-BEC crossover, *Phys. Rev. Lett.* **95**, 250404 (2005).
14. M. Greiner, C. A. Regal, J. T. Stewart, and D. S. Jin, Probing pair-correlated fermionic atoms through correlations in atom shot noise, *Phys. Rev. Lett.* **94**, 110401 (2005).
13. E. Hodby, S. T. Thompson, C. A. Regal, M. Greiner, A. C. Wilson, D. S. Jin, E. A. Cornell, and C. E. Wieman, Production efficiency of ultracold Feshbach molecules in bosonic and fermionic systems, *Phys. Rev. Lett.* **94**, 120402 (2005).
12. M. Greiner, C. A. Regal, and D. S. Jin, Probing the excitation spectrum of a Fermi gas in the BCS-BEC crossover regime, *Phys. Rev. Lett.* **94**, 070403 (2005).
11. C. A. Regal, M. Greiner, and D. S. Jin, Observation of resonance condensation of fermionic atom pairs, *Phys. Rev. Lett.* **92**, 040403 (2004).
10. M. Greiner, C. A. Regal, C. Ticknor, J. L. Bohn, and D. S. Jin, Detection of spatial correlations in an ultracold gas of fermions, *Phys. Rev. Lett.* **92**, 150405 (2004).
9. M. Greiner, C. A. Regal, and D. S. Jin, Emergence of a molecular Bose-Einstein condensate from a Fermi gas, *Nature* **426**, 537 (2003).
8. C. A. Regal, M. Greiner, and D. S. Jin, Lifetime of molecule-atom mixtures near Feshbach resonance in ^{40}K , *Phys. Rev. Lett.* **92**, 083201 (2004).
7. C. Ticknor, C. A. Regal, D. S. Jin, and J. L. Bohn, Multiplet structure of Feshbach resonances in nonzero partial waves, *Phys. Rev. A* **69**, 042712 (2004).
6. C. A. Regal, C. Ticknor, J. L. Bohn, and D. S. Jin, Creation of ultracold molecules from a Fermi gas of atoms, *Nature* **424**, 47 (2003).
5. C. A. Regal and D. S. Jin, Measurement of positive and negative scattering lengths in a Fermi gas of atoms, *Phys. Rev. Lett.* **90**, 230404 (2003).
4. C. A. Regal, C. Ticknor, J. L. Bohn, and D. S. Jin, Tuning p -wave interactions in an ultracold Fermi gas of atoms, *Phys. Rev. Lett.* **90**, 053201 (2003).
3. T. Loftus, C. A. Regal, C. Ticknor, J. L. Bohn, and D. S. Jin, Resonant control of elastic collisions in an optically trapped Fermi gas of atoms, *Phys. Rev. Lett.* **88**, 173201 (2002).
2. B. P. Anderson, P. C. Haljan, C. A. Regal, D. L. Feder, L. A. Collins, C. W. Clark, and E. A. Cornell, Watching dark solitons decay into vortex rings in a Bose-Einstein condensate, *Phys. Rev. Lett.* **86**, 2926 (2001).
1. J. R. Brandenberger, C. A. Regal, R. O. Jung, and M. C. Yakes, Fine-structure splittings in ^2F states of rubidium via three-step laser spectroscopy, *Phys. Rev. A* **65**, 042510 (2002).

Invited articles:

2. C. A. Regal, Perspective: Bringing order to trapped neutral atom arrays, *Science* **354**, 972 (2016).
1. A. M. Kaufman and C. A. Regal, Viewpoint: Electron model captured by atom pair, *Physics* **8**, 16 (2015).

Non-refereed publications and proceedings:

9. M. Urmeý, S. Mittal, K. Adachi, L. Talamo, S. Dickson, S.-X. Lin, R. Delaney, B.M. Brubaker, J. Kindem, N. Frattini, K.W. Lehnert, and C.A. Regal, Stable optomechanical Fabry-Pérot architecture in a continuous microwave-to-optical transducer, SPIE Quantum West 12911 (2024).

8. T.-W. Hsu, T. Thiele, W. Zhu, M. O. Brown, S. B. Papp, A. Agrawal, C. A. Regal, Atom Trapping with Metasurface Optics, *CLEO: Science and Innovations (OSA Technical Digest)*, JW2A. 12 (2020)
7. R. W. Andrews, R. W. Peterson, T. P. Purdy, K. Cicak, R. W. Simmonds, C. A. Regal, and K. W. Lehnert, Laser resonators, microresonators, and beam control XVII, *Proceedings of SPIE*, 934309 (2015).
6. P.-L. Yu, T. P. Purdy, G. D. Cole, C. A. Regal, New directions in high-Q optomechanical membrane resonators, *CLEO: Science and Innovations (OSA Technical Digest)*, No. CW3F.8 (2013).
5. T. P. Purdy, R. W. Peterson, P.-L. Yu, and C. A. Regal, A cryogenic cavity optomechanics system for membrane microresonators, *CLEO: Science and Innovations (OSA Technical Digest)*, No. CW3M.5 (2012).
4. Takao Aoki, A. S. Parkins, D. J. Alton, C. A. Regal, Barak Dayan, E. Ostby, K. J. Vahala, H. J. Kimble, Efficient routing of single photons with one atom and a microtoroidal cavity, *CLEO: Science and Innovations (OSA Technical Digest)*, No. IMF1 (2009).
3. D. S. Jin and C. A. Regal, Fermi gas experiments, *Proceedings of the International School of Physics "Enrico Fermi"* (2006).
2. C. A. Regal and D. S. Jin, Realization of the BCS-BEC crossover with a Fermi gas of atoms, *Advances in Atomic, Molecular, and Optical Physics*, Elsevier, London, Vol. 54, Chpt. 1 (2006).
1. M. Greiner, C. A. Regal, and D. S. Jin, Fermionic condensates, *Atomic Physics 19: XIX International Conference on Atomic Physics*, Vol. 770 (2005).

TEACHING

Courses:

- Electronics for the physical sciences, PHYS 3330, Spring 2010
- Electronics for the physical sciences, PHYS 3330, Spring 2011
- Physics II: Electricity and magnetism (2nd position), PHYS 1120, Fall 2011
- Quantum mechanics and atomic physics I, PHYS 3220, Spring 2012
- Physics II: Electricity and magnetism (2nd position), PHYS 1120, Fall 2012
- Quantum mechanics and atomic physics I, PHYS 3220, Spring 2013
- Experimental modern physics, PHYS 2150, Fall 2013
- Experimental modern physics, PHYS 2150, Fall 2014
- Light and Color, PHYS 1230, Spring 2015
- Electronics for the physical sciences, PHYS 3330, Fall 2015
- Light and Color, PHYS 1230, Spring 2016
- Quantum mechanics and atomic physics II, PHYS 4410, Spring 2017
- Physics I: Classical mechanics, PHYS 1110, Spring 2018
- Physics II: Electricity and magnetism, PHYS 1120, Fall 2018
- Physics I: Classical mechanics, PHYS 1110, Fall 2019
- Electronics for the physical sciences, PHYS 3330, Spring 2021
- Electronics for the physical sciences, PHYS 3330, Spring 2022
- Physics I: Classical mechanics algebra based, PHYS 2010, Spring 2023
- Electronics for the physical sciences, PHYS 3330, Spring 2024

Advising:

Current Research group members:

- Luca Talamo, graduate student
- Zhenpu Zhang, graduate student
- Thanmay Sunil-Menon, graduate student
- Steven Pampel, graduate student
- Kazemi Adachi, graduate student
- Sheng-Xiang Lin, graduate student
- Sofia Brown, graduate student
- Sarah Dickson, graduate student
- Jamie Boyd, graduate student
- Max Olberding, graduate student

- Ravid Shaniv, postdoctoral researcher

- Ruomu Zhang, CU undergraduate student
- Ned Graf, CU undergraduate student

Past Research group members:

- Adam Kaufman, graduate student (PhD 2015)
- Pen-Li Yu, graduate student (PhD 2015)
- Brian Lester, graduate student (PhD 2016)
- Robert Peterson, graduate student (PhD 2017)
- Mark Brown, graduate student (PhD 2021)
- Christopher Reetz, graduate student (PhD 2023)
- Ting-Wei Hsu, graduate student (PhD 2024)
- Maxwell Urmey, graduate student (PhD 2024)
- Christopher Kiehl, graduate student (PhD 2024)

- Thomas Purdy, postdoctoral researcher (currently Assist Prof U Pittsburgh)
- Nir Kampel, postdoctoral researcher (currently at startup in Israel)
- Ran Fischer, postdoctoral researcher (currently at Rafael Israel)
- Andrew Higginbotham, postdoctoral researcher, co-advised (currently Assist Prof UChicago)
- Yiheng Lin, postdoctoral researcher (currently Assist Prof USTC China)
- Tobias Thiele, postdoctoral researcher (currently at Zurich Instruments)
- Benjamin Brubaker, postdoctoral researcher, co-advised (currently at Quanta magazine)
- Jonathan Kindem, postdoctoral researcher (currently at Atom Computing)
- Nick Frattini, postdoctoral researcher, co-advised (currently at Nord Quantique)
- Matteo Marinelli, postdoctoral researcher, co-advised (currently Italy)

- Kai-Nicholas Schymik, visiting student (University of Heidelberg)
- Kathrin Kleinbach, visiting student (University of Stuttgart)

- Niclas Luick, visiting student (University of Hamburg)
- Oliver Wipfli, visiting master's student (ETH Zurich)
- Undergraduate research students: Ian Caldwell (CU) , Yeghishe Tsaturyan (visiting), Gustaf Downs (NSF REU), Joshua Karpel (CU), Cooper Sinai-Yunker (visiting), Michael Winterfeld (CU), Benjamin Miller (CU), Rachel Lindley (visiting), Mika Chmielewski (NSF REU), Nia Burrell (NSF REU), Remi Ruyle (CU), Kristina Boecker (NSF REU), Kevin Acosta (FIU)
- Undergraduate research students completing CU honors thesis: Christine Alvarez (Magna Cum Lauda), Alec Jenkins (Summa Cum Lauda), Gabriel Assumpcao (Summa Cum Lauda), Dylan McNally (Summa Cum Lauda), Randall Ball (Summa Cum Lauda), Daniel Wagner (Summa Cum Lauda), Max Kolanz (Summa Cum Lauda), Sanjay Kumar Keshava (Summa Cum Lauda)

SERVICE

- *Journal reviewer for:* Physical Review Letters, Physical Review A, Physical Review B, Physical Review X, Applied Physics Letters, Journal of Applied Physics, Entropy, Journal of Physics B, Nano Letters, Optica, Nature, Nature Physics, Nature Photonics, Science, Science Advances
- *Journal editorial Board Member:* Physical Review X (2018 – present)
- *Journal advisory Board Member:* Journal of Physics B: AMO Physics (2015 – 2018)
- *Program committees:* International Conference on Atomic Physics (ICAP) (2017, 2024); OSA Quantum 2.0 conference (2019); APS DAMOP meeting (2018 – 2022); German Physical Society (DPG) fall meeting (2019)
- APS DAMOP executive committee member (2018 - 2022)
- Member and chair (2018) of APS DAMOP AMO Thesis Jin Prize Committee (2017 – 2018)
- Gordon Research Conference (GRC): Mechanical Systems in the Quantum regime co-chair (2019 – 2022)
- Organizer of Moore Foundation workshop on mechanical precision sensors (2019)
- Selection committee for 2020 Paul Ehrenfest Best Paper Award for Quantum Foundations
- CU physics department committees in past 12 years: Arts & Science undergraduate advising, Undergraduate research committee, Graduate Committee, Strategic planning committee, Executive committee, Mentoring committee, Hiring planning committee
- University of Colo. Research and Innovation Office (RIO) advisory board (2017 – 2019)
- NSF Quantum Leap Challenge Institute centered at University of Illinois, HQAN, Advisory board member (2021 – present)
- Junior faculty advising, on mentoring committee for two junior professors, physics and engineering (2020 – present)
- JILA NSF Physics Frontier Center co-PI and Executive Committee Member (2016 – present)

- CUBit Quantum Initiative: Associate Director for Science (2020 – present)
- Organizer of Beilstein Nanotechnology Symposium: Mechanical quantum devices, Rudesheim, Germany (2024)

INVITED PRESENTATIONS

Invited talks at conferences and workshops:

- US-Japan Joint Seminar on Quantum Electronics, Stanford, Sept 2024, *Optical readout of a superconducting-qubit via a micromechanical resonator*
- Beilstein Nanotechnology Symposium, Frankfurt, Germany, Sept 2024 *Optomechanics under thermal gradients*
- Balleroy Workshop on Quantum Devices, Normandy, France, Sept 2024, *Quantum optomechanics with membrane resonators*
- International Conference on Atomic Physics, ICAP 2024, London, July 2024, *An optical tweezer array in a cryogenic environment*
- Nobel symposium: Quantum control of mechanical systems, Gothenburg, Sweden, July 2024, *Optomechanics under thermal gradients*
- Gordon Research conference, Mechanical systems in the quantum regime, Ventura, CA, March 2024, *Optomechanics under thermal gradients*
- Niels Bohr Centennial Symposium: Frontiers in Quantum Science and Technology, Copenhagen, October 2022, *Superconducting qubit readout through low backaction electro-optic transduction*
- Heraeus Seminar: Frontiers of quantum gas microscopy, Bad Honnef Germany (online), April 2022, *Time-of-flight quantum tomography of single atom motion in an optical tweezer*
- APS March Meeting, Physical Review Invited Session: Forefront Research Across Disciplines, Chicago, March 2022, *Quantum tomography of motion in time of flight*
- Quantum, Atomic, and Molecular physics, United Kingdom (online), August 2021, *Catching, interfering, and entangling bosonic atoms*
- Heraeus Seminar: Photonic links for quantum technology platforms, Bad Honnef Germany (online), June 2021, *Towards mechanically-mediated electro-optic transduction*
- CLEO OSA conference, San Jose (online), May 2021, *An efficient microwave-optical interconnect via mechanical motion*
- QCE20 IEEE workshop on Photonic technologies for quantum information science (online), October 2020: *Towards connecting microwave and optical photons with mechanical motion*
- Mesoscopic cold atom systems in and out of equilibrium (MCAS), Dresden, Germany (online), September 2020: *Bosonic atoms in optical tweezers*
- CINT annual meeting, New Mexico (online), September 2020: *Towards connecting microwave and optical photons with mechanical motion*
- NanoMRI17 Conference, Weizmann Institute, Israel (online), March 2020: *SiN phononic crystals and cavity readout for spin sensing*
- Aspen Center for Physics Workshop, February 2020: *Quantum measurement and sensing with membrane cavity optomechanics*
- International conference on quantum metrology and sensors, Paris, Dec 2019: *Quantum sensing and transduction with micromechanical membranes*

- Northwest Quantum Nexus workshop on Quantum Transduction, Seattle, Nov 2019: *Towards quantum electro-optic transduction via micromechanical motion*
- Hybrid nanomechanical devices Monte Verita, Switzerland, July 2019: *Hybrid optomechanics with SiN membranes: Force-detected magnetic resonance*
- International Workshop on Nanomechanical Sensors, 16th annual, NMC, June 2019: *Towards quantum electro-optic transduction via micromechanical motion*
- WOMBAT Optomechanics and Brillouin Scattering, Israel, March 2019: *Using ponderomotive squeezing to improve displacement detection*
- INQNET quantum transduction workshop, Caltech, September 2018: *Electro-optic conversion via micromechanical motion*
- Quantum Sciences Gordon Research Conference (GRC), Stonehill College, March 2018: *Interferometers harnessing micromechanics for quantum metrology and information*
- Mechanical Systems in the Quantum Regime Gordon Research Conference (GRC), Ventura, March 2018: *Hybrid Mechanical Systems*
- APS March Meeting, Los Angeles, California, March 2018: *Interfering and entangling neutral atoms in optical tweezers*
- Australia/New Zealand Conference on Quantum Optics (ANZCOP), Queenstown, New Zealand, December 2017: *Prospects for a quantum electro-optic device through micromechanical motion*
- International Center for Theoretical Physics (ICTP), Trieste, Sept 2017: *Electro-optic correlations improve an efficient mechanical converter*
- Atomic Physics Gordon Research Conference (GRC), Salve Regina Univ, June 2017: *Interfering and entangling single bosonic atoms*
- APS DAMOP meeting, Sacramento, CA, June 2017: *Constructing quantum states of light with moving mirrors*
- Heraeus Quantum-limited metrology and sensing conference, Bad Honnef, Germany, Feb 2017: *Improving broadband displacement detection with quantum correlations*
- Quantum Nanomechanics 2016, Monte Verita, Switzerland, July 2016: *Improving broadband displacement detection via quantum correlations*
- KITP Few-Body systems, Santa Barbara, CA, Nov 2016: *Interfering and entangling single neutral atoms*
- Workshop on many-body quantum dynamics and open quantum systems, Glasgow, UK, Sept 2016: *Towards a quantum interface between electricity and light*
- Southwest Quantum Information and Technology (SQuINT) meeting, Albuquerque, NM, February 2016: *Interfering and entangling single neutral atoms*
- Gordon Research Conference – Mechanical Systems in the Quantum Regime, March 2016: *Towards a quantum interface between electricity and light*
- BEC 2015 Frontiers in Quantum Gases, Barcelona, Spain, September 2015: *Experiments with two bosonic atoms: Hong-Ou-Model effect and spin exchange entanglement*
- APS DAMOP meeting, Columbus, OH, June 2015: *Interfering and entangling single neutral atoms*
- ITAMP workshop on hybrid quantum systems, Tucson, AZ, February 2015: *Towards a quantum interface between electricity and light*
- Physics of Quantum Electronics (PQE) Conference, January 2015, Snowbird, UT

- Frontier in Optics/Laser Science, APS/DLS, Tucson, AZ, October 2014: *Efficient and bidirectional conversion between microwave and optical light*
- International Conference on Atomic Physics, Washington DC, August 2014: *Two-atom quantum interference in tunnel-coupled optical tweezers*
- Quantum Nanomechanics 2013, Monte Verita, Switzerland, July 2013: *Observation of radiation pressure shot noise and squeezed light with an optomechanical device*
- APS March Meeting, Baltimore, Maryland, March 2013: *Exploring quantum limits with micromechanical membranes*
- KITP New directions in the quantum control landscape, Santa Barbara, California, February 2013: *Observation of radiation pressure shot noise on a solid object*
- Workshop on orbital physics in cold atom systems, Chinese Academy of Sciences, Beijing, January 2013: *Laser cooling a single atom in an optical tweezer to its 3D ground state*
- Quantum interfaces: Integrating light, atoms and solid-state devices, IOP, Milton Keynes, United Kingdom, May 2012: *Cavity optomechanics with hybrid membrane microresonators*
- Mechanical Systems in the Quantum Regime Gordon Conference, Galveston, Texas, March 2012: *Cavity optomechanics with hybrid membrane microresonators*
- Atomic Physics Gordon Conference, Mount Snow, Vermont, July 2011: *Cavity optomechanics for a microwave to optical quantum link*
- New Laser Scientist's Conference, Rochester, New York, November 2010: *From cavity electromechanics to cavity optomechanics*
- International Conference on Atomic Physics, Cairns, Australia, July 2010: *From cavity electromechanics to cavity optomechanics*
- APS March meeting, New Orleans, Louisiana, March 2008, in focus session on 'Approaching quantum limits in optomechanical systems': *Measuring nanomechanical motion with a microwave cavity interferometer*
- APS DAMOP meeting, Calgary, Alberta, Thesis prize session, May 2007: *Experimental realization of BCS-BEC crossover physics with a Fermi gas of atoms*
- APS March meeting, Baltimore, Maryland, March 2006: *Studying the BCS-BEC crossover regime with a Fermi gas of ^{40}K atoms*
- Conference on the theory of quantum gases and quantum coherence, Cortona, Italy, October 2005: *Studying the BCS-BEC crossover with a Fermi gas of ^{40}K atoms*
- Workshop on new developments in quantum gases, University of Washington Institute for Nuclear Theory, Seattle, Washington, August 2005: *Studying the BCS-BEC crossover with a Fermi gas*
- Aspen physics workshop, Aspen, Colorado, June 2005: *Paired Fermi gases: From BCS-BEC crossover physics to probing pair-correlated atoms through correlations in atom shot noise*
- Atomic physics Gordon conference, Tilton, New Hampshire, July 2005: *Studying the BCS-BEC crossover regime with a Fermi gas of atoms*
- APS March meeting, Montreal, Quebec, March 2004: *Condensation of fermionic atom pairs*
- Bose-Einstein Condensation 2003, San Feliu de Guixols, Spain, September 2003: *Creation of ultracold molecules from a Fermi gas of atoms*

Invited seminars and colloquia:

- University of Michigan Quantum Colloquium, Nov 2024, *An optical tweezer array in a cryogenic environment*
- IQOQI Quantum Seminar, Innsbruck Austria, June 2023, *Controlling and characterizing single-atom motion in optical tweezers*
- Vienna Quantum Colloquium, June 2023, *Time-of-flight quantum tomography of an atom in an optical tweezer*
- Munich Center for Quantum Science and Technology Colloquium, May 2023, *Optical readout of a superconducting qubit through a micromechanical membrane*
- Simons Presidential Colloquium, New York April 2023, *Making quantum states of light with moving mirrors*
- Stanford QFARM quantum seminar, December 2022, *Time of flight quantum tomography of an atom in an optical tweezer*
- Harvard/MIT CUA Seminar, at MIT, September 2022, *Low-backaction optical readout of a superconducting qubit*
- University of Colorado Physics Colloquium, August 2022, *Time of flight quantum tomography of an atom in an optical tweezer*
- Illinois Quantum Information Science and Technology Center seminar (online), November 2021, *Quantum optomechanics in interferometry and transduction*
- McGill Physics Society Colloquium (online), January 2021, *Making quantum states of light with moving mirrors*
- University of Oklahoma physics Colloquium (online), November 2020, *Quantum experiments with mechanical motion of solids*
- Manne Siegbahn lecture in experimental physics, Albanova University, Sweden, (online) October 2020, *Quantum experiments with mechanical motion of solids*
- Ames Laboratory quantum seminar, Iowa (online), October 2020, *Interferometry in a strong light: Making quantum states of light with moving mirrors*
- NSF Colloquium, February 2020: *Interferometry in a strong light: Making quantum states of light with moving mirrors*
- University of Chicago, James Franck Institute seminar, January 2020: *Explorations in cold collisions and magnetometry with cold atoms in optical tweezers*
- Hertz Foundation meeting, August 2019: *Quantum motion of mechanical devices*
- Purdue Physics Colloquium, April 2019: *Radiation pressure forces in interferometry: Long-standing and new quantum challenges*
- Georgia Tech Physics Colloquium, March 2019: *Interferometry in a strong light*
- Yale Physics Club Colloquium, April 2019: *Catching, interfering, and entangling single bosonic atoms*
- Bryn Mawr Physics Colloquium, March 2019: *Interferometry in a strong light*
- Vienna CoQUIS institute colloquium, University of Vienna, January 2019: *Harnessing correlations in electro-optic conversion and quantum-limited interferometry*
- TU Wien seminar, Vienna, January 2019: *Catching, interfering, and entangling single bosonic atoms*
- Niels Bohr Institute, Quantum Physics seminar, Copenhagen, January 2019: *Catching, interfering, and entangling single bosonic atoms*
- Boulder Condensed Matter Summer School: Quantum Information, July 2018: Three lectures

- Heidelberg Center for Quantum Dynamics Colloquium, Heidelberg, Germany, January 2018: *Measurement-based entanglement of non-interacting bosonic atoms*
- Max-Planck-Institut for Quantenoptik (MPQ) Colloquium, Garching, Germany, January 2018: *Prospects for a quantum electro-optic converter via micromechanical motion*
- University of Queensland physics colloquium, December 2017: *Interferometry in a strong light*
- University of Queensland seminar, December 2017: *Interfering and entangling single bosonic atoms*
- University of Minnesota physics colloquium, October 2017: *Interferometry in a strong light*
- University of Minnesota condensed matter seminar, October 2017: *Prospects for quantum electro-optic conversion through micromechanical motion*
- University of California, Berkeley, AMO seminar, November 2017: *Prospects for quantum electro-optic conversion through micromechanical motion*
- Innsbruck Institute for Quantum Optics and Quantum Information colloquium, September 2017: *Prospects for quantum electro-optic conversion through micromechanical motion*
- Harvard/MIT Center for Ultracold Atoms seminar, March 2017: *Interfering and entangling bosonic atoms*
- Harvard Physics Colloquium, March 2017: *Interferometry in a strong light*
- Stanford seminar, January 2017: *Improving broadband displacement detection via quantum correlations*
- University of Colorado Physics Colloquium, Sept 2015: *Interferometry in a strong light.*
- University of Maryland Joint Quantum Institute seminar, Dec 2016: *Improving displacement detection via quantum correlations*
- ETH Zurich, Physics Department Colloquium, May 2016: *Interferometry in a strong light*
- University of California, Santa Barbara, Physics Department Colloquium, May 2015: *Interferometry in a strong light*
- California Institute of Technology, Physics Department Colloquium, April 2015: *Interferometry in a strong light*
- Princeton, Physics Department Colloquium, March 2015: *Interferometry in a strong light*
- Harvard/MIT Center for Ultracold atoms seminar, November 2014: *Two-atom quantum interference in tunnel-coupled optical tweezers*
- Yale University Physics Club Colloquium, Nov 2013: *Interferometry in a strong light: Constructing quantum states of light with moving mirrors*
- Max-Planck-Institut for Quantenoptik (MPQ) Colloquium, Garching, Germany, July 2013: *Exploring quantum limits to optical measurement with mm-scale drums*
- Harvard/MIT Center for Ultracold atoms seminar, November 2011: *Cavity optomechanics with hybrid membrane resonators*
- Lawrence University, Summer Research Seminar, June 2011: *Strings and drums: Microresonators go quantum*
- The Pennsylvania State University, Atomic Physics Seminar, November 2008: *Cooling and detecting nanomechanical motion with a microwave cavity*
- Cornell University, Condensed Matter Physics Seminar, October 2008: *Cooling and measuring motion of nanomechanical oscillators with microwave fields*
- University of Maryland, Joint Quantum Institute Seminar, May 2008: *Cooling and measuring nanomechanical motion with a microwave cavity*

- University of Colorado, JILA Seminar, May 2008: *Cooling and measuring nanomechanical motion with a microwave cavity*
- California Institute of Technology, Condensed Matter Seminar, April 2008: *Measuring nanomechanical motion with a microwave cavity interferometer*
- University of Chicago, James Franck Institute Seminar, February 2008: *Measuring nanomechanical motion with a microwave cavity interferometer*
- NIST Ion Storage Group Seminar, August 2007: *Sensing nanomechanical motion with a transmission-line microwave cavity*
- University of Chicago, James Franck Institute Seminar, February 2007: *Studying the BCS-BEC crossover with a Fermi gas of atoms*
- Yale University, Condensed Matter Physics Seminar, December 2006: *Studying the BCS-BEC crossover with a Fermi gas of atoms*
- Lawrence University, Symposium, May 2006: *From tiny Cooper pairs to giant Bose-condensed molecules: Realization of BCS-BEC crossover physics with an atomic Fermi gas*
- University of Pisa, Italy, Atomic Physics Seminar, November 2005: *Studying the BCS-BEC crossover with a Fermi gas of ^{40}K atoms*
- University of California, Berkeley, Atomic Physics Seminar, September 2005: *Studying the BCS-BEC crossover with a Fermi gas of atoms*
- California Institute of Technology, Quantum Optics Seminar, April 2005: *Studying condensed matter physics with an ultracold gas: The BCS-BEC crossover with ^{40}K atoms*
- Colorado State University, Fort Collins, Colorado, Physics Seminar, November 2004: *Condensation of fermionic atom pairs*