

# Andrew Jayich

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## Education

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*Ph.D Physics, Yale University, New Haven, CT* 2012

*A.B. Physics, Harvard University, Cambridge, MA* 2004

## Research Experience

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**Assistant & Associate Professor** 2016–present  
*University of California, Santa Barbara, Santa Barbara, CA*

**Postdoctoral Researcher** 2012–2016  
*University of California, Los Angeles, Los Angeles, CA*  
Led a team that demonstrated laser cooling and trapping of atoms with an optical frequency comb on a two-photon transition.

**Postdoctoral Researcher** 2011–2012  
*California Institute of Technology, Pasadena, CA*  
Worked on enhancing the quality factor of an optomechanical system with an optical spring.

**Graduate Student Researcher** 2005–2011  
*Yale University, New Haven, CT*  
Laser cooled an optomechanical system anchored to a  $^3\text{He}$  cryostat close to its quantum ground state.

**Undergraduate Student Researcher** 2001–2005  
*Harvard University, Cambridge, MA*  
Worked in John Doyle's lab on creating a Bose-Einstein condensate (BEC) via buffer gas and evaporative cooling

## Publications

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*Relativistic Exact Two-Component Coupled-Cluster Study of Molecular Sensitivity Factors for Nuclear Schiff Moments*

Tianxiang Chen, Chaoqun Zhang, Lan Cheng, Kia Boon Ng, Stephan Malbrunot-Ettenauer, Victor V. Flambaum, Zack Lasner, John M. Doyle, Phelan Yu, Chandler J. Conn, Chi Zhang, Nicholas R. Hutzler, Andrew M. Jayich, Benjamin Augenbraun, David DeMille  
[J. Phys. Chem. A, , \(2024\)](#)

*Opportunities for fundamental physics research with radioactive molecules*

Gordon Arrowsmith-Kron, Michail Athanasakis-Kaklamanakis, Mia Au, Jochen Ballof, Robert Berger, Anastasia Borschevsky, Alexander A. Breier, Fritz Buchinger, Dmitry Budker, Luke Caldwell, Christopher Charles, Nike Dattani, Ruben P. de Groote, David DeMille, Timo Dickel, Jacek Dobaczewski, Christoph E. Düllmann, Ephraim Eliav, Jonathan Engel, Mingyu Fan, Victor Flambaum, Kieran T. Flanagan, Alyssa N. Gaiser, Ronald F. Garcia Ruiz, Konstantin Gaul, Thomas F. Giesen, Jacinda S. M. Ginges, Alexander Gottberg, Gerald Gwinner, Reinhard Heinke, Steven Hoekstra, Jason D. Holt, Nicholas R. Hutzler, Andrew Jayich, Jonas Karthein, Kyle G. Leach, Kirk W. Madison, Stephan Malbrunot-Ettenauer, Takayuki Miyagi, Iain D. Moore, Scott Moroch, Petr Navratil, Witold Nazarewicz, Gerda Neyens, Eric B. Norrgard, Nicholas Nusgart, Lukáš F. Pašteka, Alexander N Petrov, Wolfgang R. Plaß, Roy A. Ready, Moritz Pascal Reiter, Mikael Reponen, Sebastian Rothe, Marianna S. Safronova, Christoph Scheidenerger, Andrea Shindler, Jaideep T. Singh, Leonid V. Skripnikov, Anatoly V. Titov, Silviu-Marian Udrescu, Shane G. Wilkins, Xiaofei Yang  
[Rep. Prog. Phys., 87, 84301 \(2024\)](#)

*Laser cooling and trapping of  $^{224}\text{Ra}^+$*

M. Fan, Roy A. Ready, H. Li, S. Kofford, R. Kwapisz, C. A. Holliman, M.S. Ladabaum, A.N. Gaiser, J.R. Griswold, A. M. Jayich  
[PRR, 5, 43201 \(2024\)](#)

*Probing fundamental particles with molecules*

Mingyu Fan, Andrew Jayich  
[Science, 381, 28 \(2023\)](#)

*Measurement of the  $\text{Ra}^+ 7p^2 P_{3/2}$  state lifetime*

M. Fan, C. A. Holliman, A. Contractor, C. Zhang, S. F. Gebretsadken, A. M. Jayich  
[PRA, 105, 42801 \(2022\)](#)

*Radium ion optical clock*

C. A. Holliman, M. Fan, A. Contractor, S. M. Brewer, A. M. Jayich  
[PRL, 128, 33202 \(2022\)](#)

*Visible light photonic integrated Brillouin laser*

N. Chauhan, A. Isichenko, K. Liu, J. Wang, Q. Zhao, R. O. Behunin, P. T. Rakich, A. M. Jayich, C. Fertig, C. W. Hoyt, D. J. Blumenthal  
[Nature Communications, 12, 4685 \(2021\)](#)

*Optical mass spectrometry of cold  $\text{RaOH}^+$  and  $\text{RaOCH}_3^+$*

M. Fan, C. A. Holliman, X. Shi, H. Zhang, M. W. Straus, X. Li, S. W. Buechele, A. M. Jayich  
[PRL, 126, 23002 \(2021\)](#)

*Electron electric dipole moment searches using clock transitions in ultracold molecules*

Mohit Verma, Andrew M. Jayich, Amar C. Vutha  
[PRL, 125, 153201 \(2020\)](#)

*Direct measurement of the  $7s^2S_{1/2} \rightarrow 7p^2P_{3/2}$  transition frequency in  $^{226}\text{Ra}^+$*

C. A. Holliman, M. Fan, A. Contractor, M. W. Straus, A. M. Jayich  
[PRA, 102, 42822 \(2020\)](#)

*Measurements of electric quadrupole transition frequencies in  $^{226}\text{Ra}^+$*

C. A. Holliman, M. Fan, A. M. Jayich  
[PRA, 100, 62512 \(2019\)](#)

*Measurement of the  $7p^2P_{3/2}$  state branching fractions in  $\text{Ra}^+$*

M. Fan, C. A. Holliman, S. G. Porsev, M. S. Safronova, A. M. Jayich  
[PRA, 100, 62504 \(2019\)](#)

*Suppressed Spontaneous Emission for Coherent Momentum Transfer*

Xueping Long, Seejia S. Yu, Andrew M. Jayich, Wesley C. Campbell  
[PRL, 123, 33603 \(2019\)](#)

*Laser Cooling of Radium Ions*

M. Fan, C. A. Holliman, A. L. Wang, A. M. Jayich  
[PRL, 122, 223001 \(2019\)](#)

*Phonon lasing from optical frequency comb illumination of trapped ions*

M. Ip, A. Ransford, A.M. Jayich, X. Long, C. Roman, and W.C. Campbell  
[PRL, 121, 43201 \(2018\)](#)

*Direct frequency comb laser cooling and trapping*

A.M. Jayich, X. Long, and W.C. Campbell  
[Phys. Rev. X, 6, 41004 \(2016\)](#)

*Continuous all-optical deceleration and single-photon cooling of molecular beams*

A.M. Jayich, A.C. Vutha, M.T. Hummon, J.V. Porto, and W.C. Campbell  
[Physical Review A, 89, 23425 \(2014\)](#)

*Cryogenic optomechanics with a  $\text{Si}_3\text{N}_4$  membrane and classical laser noise*

A.M. Jayich, J.C. Sankey, K. Bjorke, D. Lee, C. Yang, M. Underwood, L. Childress, A. Petrenko, S.M. Girvin, and J.G.E. Harris  
[New Journal of Physics, 14, 115018 \(2012\)](#)

*Fiber-cavity-based optomechanical device*

N.E. Flowers-Jacobs, S.W. Hoch, J.C. Sankey, A. Kashkanova, A.M. Jayich, C. Deutsch, J. Reichel, and J.G.E. Harris

[Applied Physics Letters](#), **101**, 221109 (2012)

*Strong and Tunable Nonlinear Optomechanical Coupling in a Low-Loss System*

J.C. Sankey, C. Yang, B.M. Zwickl, A.M. Jayich, and J.G.E. Harris

[Nature Physics](#), **6**, 707 (2010)

*Dispersive optomechanics: a membrane inside a cavity*

A.M. Jayich, J.C. Sankey, B.M. Zwickl, C. Yang, J.D. Thompson, S.M. Girvin, A.A. Clerk, F. Marquardt, and J.G.E. Harris

[New Journal of Physics](#), **10**, 95008 (2008)

*High quality mechanical and optical properties of commercial silicon nitride membranes*

B.M. Zwickl, W.E. Shanks, A.M. Jayich, C. Yang, A.C. Bleszynski Jayich, J.D. Thompson, J.G.E. Harris

[Applied Physics Letters](#), **92**, 103125 (2008)

*Strong dispersive coupling of a high-finesse cavity to a micromechanical membrane*

J.D. Thompson, B.M. Zwickl, A.M. Jayich, F. Marquardt, S.M. Girvin, and J.G.E. Harris

[Nature](#), **452**, 6715 (2008)

*Stable, mode-matched, medium-finesse optical cavity incorporating a micromechanical cantilever*

J.G.E. Harris, B.M. Zwickl, and A.M. Jayich

[Review of Scientific Instruments](#), **78**, 13107 (2007)

## Conference Proceedings

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*Ion optical clocks with three electronic states*

C.A. Holliman, M. Fan, A.M. Jayich

[SPIE Photonics West](#), (2023)

*Improved "Position Squared" Readout Using Degenerate Cavity Modes*

J.C. Sankey, A.M. Jayich, B.M. Zwickl, C. Yang, and J.G.E. Harris

[Proceedings of the XXI International Conference on Atomic Physics](#), (2009)

edited by R. Cote, P.L. Gould, and M. Rozman, World Scientific, Singapore

*Linear optical properties of a high-finesse cavity dispersively coupled to a micromechanical membrane*

J.G. E. Harris, A.M. Jayich, B.M. Zwickl, C. Yang, and J.C. Sankey

[SPIE](#), **6907**, (2008)

## Talks

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*Radium ions and radium-bearing molecules for precision measurement*

**Invited Talk**, APS DAMOP meeting, Fort Worth, TX, June 2024

*Radioactive atoms and molecules for precision measurements*

**Invited Talk**, University of New Mexico Physics Colloquium, Albuquerque, NM, November 2023

*Radium Clocks*

**Invited Talk**, European Conference on Trapped Ions, Bückeburg, Germany, September 2023

*Beyond a Curie-osity: Radioactive Molecules for Precision Measurement*

**Invited Talk**, Atomic Physics Gordon Research Conference, Newport, RI, June 2023

*Laser cooling and trapping radioactive atoms and molecules*

**Invited Talk**, Northwestern Physics Colloquium, Evanston, IL, February 2023

*Using atomic structure to reduce photonic overhead for optical clocks*

**Invited Talk**, SPIE Photonics West, San Francisco, CA, January 2023

*Towards measuring atom aging with a radioactive optical clock*

**Invited Talk**, Physics of Quantum Electronics 2023, Snowbird, Utah, January 2023

*Laser cooling and trapping radioactive molecules and atoms*

**Invited Talk**, Caltech Physics colloquium, Pasadena, CA, November 2022

*Searching for symmetry violations with radioactive molecules*

**Invited Talk**, APS DAMOP meeting, Orlando, FL, May 2022

*A radioactive optical clock*

**Invited Talk**, Northern Arizona University Physics Colloquium, Flagstaff, AZ, March 2022

*There's plenty of room at the bottom: exploring radium ions and radioactive molecules*

**Invited Talk**, Duke seminar, Durham, NC, February 2022

*Radium ions and radioactive molecules*

**Invited Talk**, UNC Physics colloquium, Chapel Hill, NC, January 2022

*A radium ion optical clock*

**Invited Talk**, SPIE Photonics West, San Francisco, CA, January 2022

*Radium ions and radioactive molecules*

**Invited Talk**, UCSB Physics Department Colloquium, Santa Barbara, CA, November 2021

*Studying radioactive atoms and molecules with a quantum information toolset*

**Invited Talk**, Nuclear Science Seminar, Facility for Rare Isotope Beams, East Lansing, MI, October 2021

*Prospects for radium molecules to search for new physics*

**Invited Talk**, New Opportunities for Fundamental Physics Research with Radioactive Molecules, Virtual, June 2021

*Radioactive molecules: high gain sensors for new physics*

**Invited Talk**, APS April Meeting, GPMFC Workshop, Virtual, April 2021

*Radium ions and cold radioactive molecules*

**Invited Talk**, Virtual AMO Seminar (VAMOS), Zoom/Youtube, April 2021

*Opportunities with laser-cooled radium ions*

**Invited Talk**, Quantum Foundry seminar, UC Santa Barbara, March 2021

*Cold Charged Radium*

**Invited Talk**, APS DAMOP, Portland, Oregon (via Zoom), June 2020

*Quantum simulation tools for precision measurement*

**Invited Talk**, CAIQUE research coordination meeting, virtual zoom meeting, March 2020

*Radium: a platform for precision measurement*

**Invited Talk**, Physics of Quantum Electronics 2020, Snowbird, Utah, January 2020

*Radium: An unstable cornerstone for precision measurement*

**Invited Talk**, Optical, Molecular, and Quantum Science (OMQ) Fall Symposium 2019, Bend, Oregon, September 2019

*Deformed and unstable cornerstones for precision measurement*

**Invited Talk**, FRIB Topical Program: Hadronic Electric Dipole Moments in the FRIB Era: From the Proton to Protactinium, FRIB/MSU, East Lansing, Michigan, August 2019

*One year with laser-cooled radium ions*

**Invited Talk**, Quantum optics seminar, University of Toronto, Toronto, Canada, August 2019

*Radium: An unstable cornerstone for precision measurement*

**Invited Talk**, Physics Colloquium, University of Nevada, Reno, October 2018

*(Slow) Heavy Ions*

**Invited Talk**, Monroe Lab, College Park, Maryland, June 2018

*Trapping heavy and deformed nuclei for a long, long time*

**Invited Talk**, KITP - High Energy Physics at the Sensitivity Frontier, Santa Barbara, CA, April 2018

*Direct frequency comb laser cooling and trapping*

**Invited Talk**, UCSD Condensed Matter Seminar, San Diego, CA, May 2017

*Frequency comb cooling for organic quantum chemistry*

**Invited Talk**, CAIQUE conference, Los Angeles, CA, September 2016

*Direct frequency comb laser cooling and trapping*

**Invited Talk**, UC Berkeley AMO seminar, Berkeley, CA, September 2016

*Direct frequency comb two-photon laser cooling and trapping*

Contributed Talk, DAMOP, Providence, RI, May 2016

*Direct frequency comb laser cooling and trapping*

**Invited Talk**, UCSB, Santa Barbara, CA, April 2016

*Laser cooling and trapping with optical frequency combs*

Contributed Talk, DAMOP, Columbus, OH, June 2015

*Laser cooling and trapping with optical frequency combs*

**Invited Talk**, UCSB, Santa Barbara, CA, January 2015

*Continuous all-optical deceleration of molecular beams*

Contributed Talk, DAMOP, Madison, WI, June 2014

*Optomechanics with SiN membranes: Laser cooling starting with a 400 mK base temperature*

**Invited Talk**, Cal State Univeristy - Los Angeles Physiscs Colloquium, Los Angeles, CA, Oct. 2012

*Resolved Sideband Laser Cooling of a Cryogenic Micromechanical Membrane*

**Invited Talk**, USC, Los Angeles, CA, June 2011

*Resolved Sideband Laser Cooling of a Cryogenic Micromechanical Membrane*

**Invited Talk**, Caltech, Pasadena, CA, June 2011

*Resolved Sideband Laser Cooling of a Cryogenic Micromechanical Membrane*

**Invited Talk**, IBM Almaden Research Center, San Jose, CA, June 2011

*Resolved Sideband Laser Cooling of a Cryogenic Micromechanical Membrane*

**Invited Talk**, Stanford, Palo Alto, CA, June 2011

*Resolved Sideband Laser Cooling of a Cryogenic Micromechanical Membrane*  
Contributed Talk, CLEO, Baltimore, MD, May 2011

*Optomechanics with a dispersive optomechanical system*  
**Invited Talk**, École Normale Supérieure, Paris, France, Jan. 2009

*High quality optical and mechanical properties of a dispersive optomechanical device*  
Contributed Talk, APS March Meeting, New Orleans, LA, March 2008

*Laser cooling of a microcantilever using a medium-finesse optical cavity*  
Contributed Talk, APS March Meeting, Denver, CO, March 2007

## Awards

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*National Science Foundation CAREER Award, 2021*

*Department of Energy Early Career Award, 2021*

*Moore Foundation Physics Innovation Award, 2020*

*Best Poster Award, QOMNS conference, Monte Verità - Ascona, Switzerland, 2011*

*Presidential Scholar in Academics, 2000*