Chiara P. Salemi

salemi@berkeley.edu
updated July 2026

Research Interests

Experimental searches for **axion dark matter** and **superconducting quantum sensors**

Appointments

Assistant Professor, UC Berkeley Department of Physics *2025–present*
Faculty Scientist, Lawrence Berkeley National Laboratory Physics Division *2025–present*
Porat Postdoctoral Fellow, KIPAC, Stanford University and SLAC *2022–2024*

Education

Massachusetts Institute of Technology
Ph.D., Department of Physics *2022*

University of North Carolina Chapel Hill
B.S. Physics and Mathematics, Highest Honors, Highest Distinction *2017*

Awards and Honors

Rising Stars in Physics *2023*
Martin and Beate Block Winter Award, Aspen Center for Physics *2023*
Porat Fellowship, KIPAC, Stanford/SLAC *2022*
Dr. Pliny A. and Margaret H. Price Prize, Ohio State University CCAPP *2020*
NSF Graduate Research Fellow *2018–2021*
MIT Presidential Fellow *2017–2018*
Paul E. Shearin Outstanding Senior Award in Physics, UNC Chancellor's Award *2017*
Senior Thesis Highest Honors, *Magnet Simulations for ABRACADABRA* *2017*
Phi Beta Kappa *2016*
Daniel C. Johnson Award, Outstanding junior, UNC Physics and Astronomy *2016*
Goldwater Scholar *2016*
Honors Carolina, UNC *2013–2017*

Publications

[22] D. Aybas et al. "Cavity, Lumped Circuit, and Spin-Based Detection of Axion Dark Matter: Differences and Similarities". In: *Universe* 12.4 (2026). ISSN: 2218-1997. DOI: 10.3390/universe12040106. URL: https://www.mdpi.com/2218-1997/12/4/106.

[21] H. Magoon et al. *A First Demonstration of the SQUAT Detector Architecture: Direct Measurement of Resonator-Free Charge-Sensitive Transmons*. 2026. arXiv: 2601.16261 [physics.ins-det]. URL: https://arxiv.org/abs/2601.16261.

[20] A. AlShirawi et al. "Electromagnetic modeling and science reach of DMRadio-m^3". In: *Physical Review D* 112.5 (Sept. 2025). ISSN: 2470-0029. DOI: 10.1103/bwgd-kxsb. URL: http://dx.doi.org/10.1103/bwgd-kxsb.

[19] V. Ankel et al. "Noise limits for dc SQUID readout of high-Q resonators below 300 MHz". In: *Journal of Applied Physics* 138.9 (Sept. 2025). ISSN: 1089-7550. DOI: 10.1063/5.0280831. URL: http://dx.doi.org/10.1063/5.0280831.

[18] Y. Balaji et al. *Low-Gap Hf-HfOx-Hf Josephson Junctions for meV-Scale Particle Detection*. Oct. 2025. arXiv: 2510.25203 [cond-mat.supr-con]. URL: https://arxiv.org/abs/2510.25203.

[17] G. Hoshino et al. "First Axionlike Particle Results from a Broadband Search for Wavelike Dark Matter in the 44 to 52 μeV Range with a Coaxial Dish Antenna". In: *Physical Review Letters* 134.17 (Apr. 2025). ISSN: 1079-7114. DOI: 10.1103/physrevlett.134.171002. URL: http://dx.doi.org/10.1103/physrevlett.134.171002.

[16] K. M. W. Pappas et al. *High-Frequency Gravitational Wave Search with ABRACADABRA-10 cm*. 2025. arXiv: 2505.02821 [hep-ex]. URL: https://arxiv.org/abs/2505.02821.

[15] C.W. Fink et al. "Superconducting quasiparticle-amplifying transmon: A qubit-based sensor for meV-scale phonons and single terahertz photons". In: *Physical Review Applied* 22.5 (Nov. 2024). ISSN: 2331-7019. DOI: 10.1103/physrevapplied.22.054009. URL: http://dx.doi.org/10.1103/physrevapplied.22.054009.

[14] S. Knirck et al. "First Results from a Broadband Search for Dark Photon Dark Matter in the 44 to 52μeV Range with a Coaxial Dish Antenna". In: *Phys. Rev. Lett.* 132 (13 Mar. 2024), p. 131004. DOI: 10.1103/PhysRevLett.132.131004. URL: https://link.aps.org/doi/10.1103/PhysRevLett.132.131004.

[13] C. B. Adams et al. *Axion Dark Matter* (*Snowmass 2021 White Paper*). 2023. arXiv: 2203.14923 [hep-ex].

[12] J. N. Benabou et al. "Lumped-element axion dark matter detection beyond the magnetoquasistatic limit". In: *Phys. Rev. D* 108 (3 Aug. 2023), p. 035009. DOI: 10.1103/PhysRevD.108.035009. URL: https://link.aps.org/doi/10.1103/PhysRevD.108.035009.

[11] C. Boutan et al. "Axions beyond Gen 2". In: *International Journal of Modern Physics A* 38.33n34 (2023), p. 2330012. DOI: 10.1142/S0217751X23300120. eprint: https://doi.org/10.1142/S0217751X23300120. URL: https://doi.org/10.1142/S0217751X23300120.

[10] D. Antypas et al. *New Horizons: Scalar and Vector Ultralight Dark Matter*. 2022. arXiv: 2203.14915 [hep-ex]. URL: https://arxiv.org/abs/2203.14915.

[9] L. Brouwer et al. "Projected sensitivity of DMRadio-m^3: A search for the QCD axion below 1μeV". In: *Phys. Rev. D* 106 (10 Nov. 2022), p. 103008. DOI: 10.1103/PhysRevD.106.103008. URL: https://link.aps.org/doi/10.1103/PhysRevD.106.103008.

[8] L. Brouwer et al. "Proposal for a definitive search for GUT-scale QCD axions". In: *Phys. Rev. D* 106 (11 Dec. 2022), p. 112003. DOI: 10.1103/PhysRevD.106.112003. URL: https://link.aps.org/doi/10.1103/PhysRevD.106.112003.

[7] C. P. Salemi et al. "Search for Low-Mass Axion Dark Matter with ABRACADABRA-10 cm". In: *Phys. Rev. Lett.* 127 (8 Aug. 2021), p. 081801. DOI: 10.1103/PhysRevLett.127.081801. URL: https://link.aps.org/doi/10.1103/PhysRevLett.127.081801.

[6] J. R. Martin et al. "Skynet Algorithm for Single-dish Radio Mapping. I. Contaminant-cleaning, Mapping, and Photometering Small-scale Structures". In: *The Astrophysical Journal Supplement Series* 240.1 (Jan. 2019), p. 12. DOI: 10.3847/1538-4365/aad7c1. URL: https://doi.org/10.3847%2F1538-4365%2Faad7c1.

[5] J. L. Ouellet et al. "Design and implementation of the ABRACADABRA-10 cm axion dark matter search". In: *Phys. Rev. D* 99 (5 Mar. 2019), p. 052012. DOI: 10.1103/PhysRevD.99.052012. URL: https://link.aps.org/doi/10.1103/PhysRevD.99.052012.

[4] J. L. Ouellet et al. *First Results from ABRACADABRA-10 cm: A Search for Sub-μeV Axion Dark Matter — 2018 Data*. Mar. 2019. DOI: 10.5281/zenodo.2596057. URL: https://doi.org/10.5281/zenodo.2596057.

[3] J. L. Ouellet et al. "First Results from ABRACADABRA-10 cm: A Search for Sub-μeV Axion Dark Matter". In: *Phys. Rev. Lett.* 122 (12 Mar. 2019), p. 121802. DOI: 10.1103/PhysRevLett.122.121802. URL: https://link.aps.org/doi/10.1103/PhysRevLett.122.121802.

[2] C. P. Salemi. "First Results from ABRACADABRA-10 cm: A Search for Low-Mass Axion Dark Matter". In: *Proceedings of the 54th Rencontres de Moriond: Electroweak Interactions and Unified Theories*. Ed. by Étienne Augé, Jacques Dumarchez, and Jean Trân Thanh Vân. ARISF, 2019, pp. 229–234.

[1] M. P. Maples et al. "Robust Chauvenet Outlier Rejection". In: *The Astrophysical Journal Supplement Series* 238.1 (Aug. 2018), p. 2. DOI: 10.3847/1538-4365/aad23d. URL: https://doi.org/10.3847%2F1538-4365%2Faad23d.

Select Invited Talks

Superconducting Technologies for Dark Matter — **Rome, Italy**
Tuning in to low-mass axions with the DMRadio program — *May 2026*

Rencontres de Blois — **Blois, France**
Digging deeper and wider: experimental searches for dark matter — *May 2026*

APS Global Summit — **Denver, CO**
Experimental searches for axion dark matter — *Mar 2026*

University of British Columbia (colloquium) — **Vancouver, Canada**
Tuning in to axion dark matter: how we search for an 'invisible' particle — *Feb 2026*
Astronomy Colloquium

UC Davis (colloquium) — **Davis, CA**
Illuminating the dark side of the universe with quantum sensors — *Feb 2026*
Physics and Astronomy Department Colloquium

SPIE Photonics West – Quantum West — **San Francisco, CA**
Qubit-based sensing of THz photons and meV phonons — *Jan 2026*

COST Action: Cosmic WISPers in the Dark Universe (colloquium) — **Virtual**
Tuning in to axion dark matter with DMRadio — *Nov 2025*

Triangle Universities Research Laboratory (seminar) — **Durham, NC**
Qubits as low-energy sensors, from axions to neutrinos — *Oct 2025*

University of North Carolina Chapel Hill (colloquium) — **Chapel Hill, NC**
Tuning in the axion: how we search for an 'invisible' particle — *Oct 2025*
Department of Physics and Astronomy Colloquium

Lawrence Berkeley National Laboratory (colloquium) — **Berkeley, CA**
Tuning in to axion dark matter with DMRadio — *Sep 2025*
Interdisciplinary Instrumentation Colloquium

Lawrence Livermore National Laboratory (seminar) — **Livermore, CA**
First Measurements of SQUAT Sensors — *Aug 2025*

Livermore Center for Quantum Science

Axions in Stockholm (panel) — **Stockholm, Sweden**
Laboratory Experiments for Axion Dark Matter — *June 2025*

Berkeley Axion Workshop — **Berkeley, CA**
DMRadio-GUT: a future lumped-element search for GUT-motivated QCD axions — *May 2025*

Santa Clara University (colloquium) — **Santa Clara, CA**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter with DMRadio — *May 2024*
Physics Colloquium

KIPAC, Stanford University — **Stanford, CA**
Searching for axion dark matter with qubit-based sensors — *Mar 2024*
KIPAC Tea

Texas A&M (seminar) — **College Station, TX**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Nov 2023*
HEPEC Seminar

Caltech (seminar) — **Pasadena, CA**
Qubit-based sensing for axion dark matter — *Oct 2023*
HEP Seminar

IBS/CAPP (seminar) — **Daejeon, South Korea**
DMRadio: Searching for Low-Mass Axion Dark Matter — *July 2023*
Center for Axion and Precision Physics Research

Fermilab (seminar) — **Batavia, IL**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *May 2023*
Cosmic Physics Center Seminar

Prospecting for New Physics through Flavor, Dark Matter, and Machine Learning — **Aspen, CO**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Mar 2023*
Aspen Center for Physics Conference

King's College London (seminar) — **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Dec 2022*
EPAP Seminar

FISICA Workshop — **Virtual**
Lumped element detection for low-mass axions: ABRACADABRA and DMRadio — *Mar 2022*

Lawrence Berkeley National Laboratory (seminar) — **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Dec 2021*
Institute for Nuclear and Particle Astrophysics Seminar

Kavli Institute for Particle Astrophysics and Cosmology, Stanford — **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Dec 2021*
KIPAC Tea

Yale (seminar) — **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Dec 2021*
Mossman Seminar

Laboratory for Nuclear Science, MIT (seminar) — **Cambridge, MA**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *Nov 2021*
Lunchtime Seminar

Johns Hopkins University (seminar) — **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter — *May 2021*
Experimental HEP Seminar

Rutgers University (seminar) **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter *Apr 2021*
High Energy Experiment Seminar

Project 8 collaboration meeting (seminar) **Virtual**
The Search for Low-Mass Axion Dark Matter *Mar 2021*
External Speaker

CENPA, University of Washington (mini-seminar) **Virtual**
Seeing the Invisible: The Search for Low-Mass Axion Dark Matter *Mar 2021*
CENPA Monday Meeting

Axions Beyond Gen 2 Workshop **Virtual**
Lumped Element Searches for Low-Mass Axion Dark Matter *Jan 2021*

Boston University (seminar) **Virtual**
The Search for Low-Mass Axion Dark Matter *Dec 2020*
Student Seminar

University of Illinois Urbana-Champaign (seminar) **Virtual**
The Search for Low-Mass Axion Dark Matter *Nov 2020*
HEP/MEP Seminar

CCAPP, Ohio State University (seminar) **Virtual**
The Search for Low-Mass Axion Dark Matter *Sep 2020*
Price Prize Seminar

Rencontres de Moriond **La Thuile, Italy**
First Results from ABRACADABRA-10 cm *Mar 2019*

Purdue University (seminar) **West Lafayette, IN**
First Results from ABRACADABRA-10 cm *Nov 2018*
Particle Physics Seminar

Wright Laboratory, Yale (seminar) **New Haven, CT**
ABRACADABRA: A Search for Low-Mass Axion Dark Matter *May 2018*
Weak Interactions Discussion Group Seminar

Select Other Talks

Coordinating Panel for Advanced Detectors (CPAD) Workshop **Knoxville, TN**
First Measurements of SQUAT Sensors *Nov 2024*

Topics in Astroparticle and Underground Physics (TAUP) **Vienna, Austria**
The Search for Low-Mass Axion Dark Matter with DMRadio *Aug 2023*

Rising Stars in Physics Workshop **Berkeley, CA**
Seeing the Invisible: the Search for Axion Dark Matter *May 2023*

APS April Meeting **Virtual**
Recent results from the ABRACADABRA-10 cm search for low-mass axion dark matter *Apr 2021*

Laboratory for Nuclear Science, MIT (seminar) **Virtual**
Axion Cosmology *Apr 2020*
Student Lunch Seminar

APS Division of Particles and Fields Meeting **Boston, MA**
The Search for Low-Mass Axions with ABRACADABRA-10 cm: Preparations for Run 2 *July 2019*

APS April Meeting **Denver, CO**
COMSOL Simulations for ABRACADABRA *Apr 2019*

Laboratory for Nuclear Science, MIT (seminar) **Cambridge, MA**
ABRACADABRA: A Search for Low-Mass Axion Dark Matter *Apr 2018*
Student Lunch Seminar

Posters

Low-Temperature Detectors (LTD20) Conference **Daejeon, South Korea**
Qubit-Based Sensing of THz Photons and Phonons for Dark Matter Detection *July 2023*

Quantum Information and Systems for Fundamental Physics Conference **Aspen, CO**
ABRACADABRA: Searching for Low-Mass Axion Dark Matter *Feb 2020*

Dept of Physics, MIT **Cambridge, MA**
First Results from ABRACADABRA-10 cm, A Search for Low-Mass Axion Dark Matter *Apr 2018*
Won second prize at open house poster session

UCLA Dark Matter **Los Angeles, CA**
ABRACADABRA: A Search for Low-Mass Axion Dark Matter *Feb 2018*

Division of Nuclear Physics (DNP) Fall Meeting **Vancouver, Canada**
Microwave cavity tuning with nonlinear dielectric films for axion searches *Oct 2016*
Awarded funding by the Conference Experience for Undergraduates (CEU)

38th International Conference on High Energy Physics (ICHEP) **Chicago, IL**
Tuning microwave cavities with biased nonlinear dielectrics for axion searches *Aug 2016*

Division of Nuclear Physics (DNP) Annual Fall Meeting **Santa Fe, NM**
Testing new designs for the Majorana Demonstrator's low-mass front-end board *Oct 2015*
Awarded maximum funding by the Conference Experience for Undergraduates (CEU)

Teaching

Searches for axions, N3AS Multimessenger Astrophysics School *July 2026*
Wave-like dark matter experiments, GGI Theory Meets Experiment Direct Detection School *Nov 2025*
Instrumentation Laboratory 111a (Analog Electronics) *2025, 2026*

Select Service and Outreach

Journal Referee
Physical Review Journals, Nature Journals, IEEE Journals

Keynote speaker: Shining Light on Dark Matter
REYES Program *July 2025*

Workshop organizer, Pollica
The Strong CP Problem and its Possible Solutions *June 2025*

Conference organizer, LBL
Enabling the Discovery of QCD Axion Dark Matter at the GUT Scale *May 2025*

Speaker/panelist/discussion leader for various UCB student organization events
SPS, SWPS, MPS Scholars *Spring 2025*

Panelist, CU*IP
UC Berkeley/LBNL *Jan 2025*

Panelist, State of Quantum: Quantum Networks and Sensors
Stanford QFARM *Sep 2024*

Talks to AP Physics students: Shining Light on Dark Matter
San Mateo High School *May 2024*

Cosmology and dark matter lecture
SPINWIP program for high school girls, KIPAC, Stanford University *July 2023*

Public lecture–Shining light on dark matter
KIPAC Community Day, Stanford University *April 2023*

Booth volunteer (WIMP dark matter)
KIPAC Community Day, Stanford University *April 2023*

Faculty hiring pre-search committee member
MIT Laboratory for Nuclear Science *Spring & Fall 2021*

Application reviewer for MIT Summer Research Program (MSRP)
MIT *2021*
University-wide internship program for under-represented minority undergraduates

Mentor in Undergraduate Mentoring Program
MIT Physics Department *Fall 2020*

Mentor in Graduate Student Buddy Program
MIT Physics Department *2018–2020*

Founded and organized neutrinos and dark matter journal club
MIT Laboratory for Nuclear Science *2018–2020*

Mentor in Graduate/Undergraduate Women in Physics Buddy Program
MIT Physics Department *Fall 2019*

Girl's Day activity leader
MIT Museum *2017*

On-campus outreach director
Carolina Women in Physics (WiP) *2016-2017*

Tour co-leader for two elementary school programs
Morehead Observatory, UNC *2016*