

Caleb W. Fink

Assistant Professor

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Professional Appointments

Assistant Professor Syracuse University	2025 - Current
Guest Scientist Los Alamos National Laboratory	2025 - Current
Director & Postdoctoral Fellow Los Alamos National Laboratory	2023 - 2025
Postdoctoral Researcher Los Alamos National Laboratory	2022 - 2023

Education

PhD in Physics, University of California, Berkeley ‡ Thesis: <i>A Gram-Scale Low-T_c Low-Surface-Coverage Athermal-Phonon Sensitive Dark Matter Detector</i> ‡ Advisor: Matt C. Pyle	2022
B.S. in Applied Physics <i>Summa Cum Laude</i> , University of California, Santa Cruz	2016

Conferences and Workshops

Invited Talks

‡ <u>EXCESS 25 workshop</u> (Santa Fe, NM) - <i>“Qubit Sensors and the Low-Energy Excess: First Results from SQUAT Detectors”</i>	May 31, 2025
‡ LANL Condensed Matter Theory Seminar (Los Alamos, NM) - <i>“Phonons, Qubits, and Dark Matter: Bridging Quantum Technologies and Fundamental Physics”</i>	May 12, 2025
‡ Syracuse University Physics Colloquium (Syracuse, NY) - <i>“Phonons, Qubits, and Dark Matter: Bridging Quantum Technologies and Fundamental Physics”</i>	Jan 23, 2025
‡ UNM Nuclear, Particle, Astroparticle and Cosmology Seminar (Albuquerque, NM) - <i>“Hunting for Low-Mass Dark Matter with Quantum Sensors”</i>	Oct 29, 2024
‡ <u>Dark Matter QIS Seminar</u> (SLAC, CA, virtual) - <i>“Optimal Filtering and Noise Modeling”</i>	Jun 4, 2024
‡ RF & Ionospheric R&D Seminar (Los Alamos, NM) - <i>“Signal Processing and Extracting Physics using Optimal Filtering”</i>	May 7, 2024
‡ SPIE Quantum West/Photonics West (San Francisco, CA) - <i>“Quantum Sensing at the meV Scale for Dark Matter Detection”</i>	Jan 28, 2024
‡ LBNL Instrumentation Colloquium (Berkeley, CA) - <i>“Novel Materials and Quantum Sensing at the meV Scale for Dark Matter Detection”</i>	Jan 24, 2024
‡ QMUL SNOLAB Quantum Workshop (Sudbury, Canada) - <i>“Novel Materials and Qubit Sensors for Probes of Beyond Standard Model Physics”</i>	Jan 16, 2024
‡ <u>Coordinating Panel for Advanced Detectors 2023, Early Career Plenary Session</u> (Menlo Park, CA) - <i>“Novel Quantum Materials and Sensing for Low Energy Event Detection”</i>	Nov 9, 2023
‡ <u>LANL Low Temperature Detectors Team Seminar</u> (Los Alamos, NM)	Apr 6, 2023

- <i>Athermal Phonon Sensitive Calorimetry</i>	
3 <u>DNN Quantum Sensing Workshop</u> (Berkeley, CA)	Feb 15, 2023
- <i>Quantum Sensing Technologies for Low Energy Event Detection</i>	
3 <u>SLAC KIPAC Seminar</u> (Menlo Park, CA)	Jan 24, 2022
- <i>Athermal Phonon Sensor R&D for Low-Mass Dark Matter Detectors</i>	
3 <u>Materials, Physics, and Applications - Quantum Seminar</u> (Los Alamos, NM)	Dec 17, 2021
- <i>Athermal Phonon Sensor R&D for Low-Mass Dark Matter Detectors</i>	
3 <u>SNOMASS 2021 Quantum Sensors Informational Session</u> (Virtual)	Aug 19, 2020
- <i>Athermal Phonon Sensors for Low-Mass Dark Matter</i>	
3 <u>SuperCDMS Annual Analysis Workshop, Invited Lecture</u> (Montreal, Canada)	Jul 8, 2019
- <i>Noise in SuperCDMS</i>	
3 <u>LBNL Quantum Sensor Consortium Meeting</u> (Berkeley, CA)	Feb 17, 2019
- <i>Large Area TES Characterization and Performance</i>	

Contributed Talks

3 <u>Nuclear-Particle Physics UNM/LANL Workshop</u> (Albuquerque, NM)	Sep 23, 2024
- <i>Quantum Sensor Ideas for HEP and NP</i>	
3 <u>Coordinating Panel for Advanced Detectors 2023</u> (Menlo Park, CA),	Nov 8, 2023
- <i>Development of Superconducting Qubit-Based Sensors for meV Scale Detectors</i>	
3 <u>APS March Meeting</u> (Virtual)	Mar 22, 2023
- <i>Photo-Sensitivity and Charge Transport in Novel Narrow-Bandgap Semiconductors for Single THz Photon and Dark Matter Detection</i>	
3 <u>Coordinating Panel for Advanced Detectors 2022</u> (Virtual)	Nov 30, 2022
- <i>Searching for Light Dark Matter with Narrow-Gap Semiconductors: The SPLENDOR Project</i>	
3 <u>Low Temperature Detectors 19</u> (Virtual)	Jul 28, 2021
- <i>Design of a Gram-Scale Low-Surface-Coverage Athermal-Phonon Detector for Polar Crystal Dark Matter Searches</i>	

Posters

3 <u>Coordinating Panel for Advanced Detectors 2024</u> (Knoxville, TN)	Nov 22, 2024
- <i>Recent Results from the SPLENDOR Experiment</i>	
3 <u>NPF Capability Review</u> (Los Alamos, NM)	Apr 22, 2024
- <i>Searching for Light Dark Matter with Narrow-gap Semiconductors: The SPLENDOR Experiment</i>	
3 <u>Coordinating Panel for Advanced Detectors 2023</u> (Menlo Park, CA)	Nov 7, 2023
- <i>Two-stage Cryogenic Charge Amplifier for Semiconductor Dark Matter Detectors</i>	
- <i>Overview and Status of the SPLENDOR Experiment</i>	
3 <u>Low Temperature Detectors 20</u> (Daejeon, South Korea)	Jul 24, 2023
- <i>Qubit-Based Sensing of THz Photons and Phonons for Dark Matter Detection</i>	
- <i>Two-Stage Cryogenic HEMT Amplifiers For Low Temperature Detectors</i>	
- <i>Searching for light dark matter with narrow-gap semiconductors: the SPLENDOR project</i>	
3 <u>Low Temperature Detectors 18</u> (Milan, Italy)	Jul 23, 2019
- <i>Large Area TES Chip with 40meV Resolution</i>	

Publication List

28. R. Anthony-Petersen,...**C.W. Fink**, et al. (SPICE/HeRALD Collaboration), "Low Energy Backgrounds and Excess Noise in a Two-Channel Low-Threshold Calorimeter"(2025), [Appl. Phys. Lett. 126, 102601](#)
27. C.L. Chang,... **C.W. Fink**, et al. (TESSERACT Collaboration), "First Limits on Light Dark Matter Interactions in a Low Threshold Two Channel Athermal Phonon Detector from the TESSERACT Collaboration" (2025), [arXiv:2503.03683 \[hep-ex\]](#) (Under Review at Phys. Rev. Lett.)
26. R. U. Schoenemann,...**C.W. Fink**, et al. "High Resolution Fission Fragment Spectroscopy with Superconducting Microcalorimeters"(2025), [IEEE Transactions on Applied Superconductivity, 10.1109/TASC.2024.3523251](#)
25. **C.W. Fink**, C. Salemi, B.A. Young, D.I. Schuster, N.A. Kurinsky, "The Superconducting Quasiparticle-Amplifying Transmon: A Qubit-Based Sensor for meV Scale Phonons and Single THz Photons" (2024), [Phys. Rev. Applied 22, 054009](#)
24. L. Chaplinsky, et al (TESSERACT Collaboration), "Design Studies Of A Pulsed Quasimonoenergetic 2-keV Neutron Source For Calibration Of Low Threshold Dark Matter Detectors" (2024), [arXiv:2410.14722 \[physics.ins-det\]](#) (Under Review at Phys. Rev. D)
23. R. Anthony-Petersen, et al. (SPICE/HeRALD Collaboration), "Demonstration of the HeRALD superfluid helium detector concept"(2024), [Phys. Rev. D 110, 072006](#)
22. R. Anthony-Petersen,...**C.W. Fink**, et al. (SPICE/HeRALD Collaboration), "A stress-induced source of phonon bursts and quasiparticle poisoning." [Nat Commun 15, 6444 \(2024\)](#).
21. J. Anczarski, M. Dubovskov, **C.W. Fink**, et al. "Two-Stage Cryogenic HEMT Amplifiers For Low Temperature Detectors", [J Low Temp Phys 214, 256-262 \(2024\)](#)
20. M.F. Albakry, et al. (SuperCDMS Collaboration), "First measurement of the nuclear-recoil ionization yield in silicon at 100 eV"(2023), [Phys. Rev. Lett. 131, 091801](#)
19. A. Biekert, et al. (SPICE/HeRALD Collaboration), "A portable and high intensity 24 keV neutron source based on $^{124}\text{Sb-}\beta$ Be photoneutrons and an iron filter"(2023), [JINST 18 P07018](#)
18. M.F. Albakry, et al. (SuperCDMS Collaboration), "A Search for Low-mass Dark Matter via Bremsstrahlung Radiation and the Migdal Effect in SuperCDMS"(2023), [Phys. Rev. D 107, 112013](#)
17. A. Biekert, et al. (SPICE/HeRALD Collaboration), "A backing detector for order-keV neutrons" (2022), [Nucl. Instrum. Methods. Phys. Res. B 1039, 166981](#)
16. M.F. Albakry, et al. (SuperCDMS Collaboration), "Investigating the sources of low-energy events in a SuperCDMS-HV detector"(2022), [Phys. Rev. D 105, 112006](#)
15. M.F. Albakry, et al. (SuperCDMS Collaboration), "Ionization yield measurement in a germanium CDMSlite detector using photo-neutron sources"(2022), [Phys. Rev. D 105, 122002](#)
14. A. Biekert, et al. (SPICE/HeRALD Collaboration), "Scintillation yield from electronic and nuclear recoils in superfluid He-4"(2021), [Phys. Rev. D 105, 092005](#)
13. R. Ren,... **C.W. Fink**, et al. "Design and characterization of a phonon-mediated cryogenic particle detector with an eV-scale threshold and 100 keV-scale dynamic range" [Phys. Rev. D 104, 032010 \(2021\)](#)
12. I. Alkhatib, et al. (SuperCDMS Collaboration), "Constraints on Lightly Ionizing Particles from CDMSlite" [Phys. Rev. Lett. 127, 081802 \(2021\)](#)
11. I. Alkhatib,...**C.W. Fink**, et al. (SuperCDMS Collaboration) "Light Dark Matter Search with a High-Resolution Athermal Phonon Detector Operated Above Ground" [Phys. Rev. Lett. 127, 061801 \(2021\)](#)
10. **C.W. Fink**, et al. (CPD Collaboration) "Performance of a large area photon detector for rare event search applications" [Appl. Phys. Lett. 118, 022601 \(2021\)](#)
9. D. W. Amaral, et al. (SuperCDMS Collaboration), "Constraints on low-mass, relic dark matter candidates from a surface-operated SuperCDMS single-charge sensitive detector"(2020), [Phys. Rev. D 102, 091101\(R\)](#)

8. **C.W. Fink**, et al. "Characterizing TES power noise for future single optical-phonon and infrared-photon detectors" [AIP Advances 10, 085221 \(2020\)](#) *Editor's Pick*
7. F. Ponce,... **C.W. Fink**, et al. "Modeling of Impact Ionization and Charge Trapping in SuperCDMS HVeV Detectors" [J. Low Temp. Phys. 199, pages598-605 \(2020\)](#)
6. T. Aralis, et al. (SuperCDMS Collaboration), "Constraints on dark photons and axion-like particles from the SuperCDMS Soudan experiment" [Phys. Rev. D 101, 052008 \(2020\)](#)
5. F. Ponce,...**C.W. Fink**, et al. "Measuring the impact ionization and charge trapping probabilities in SuperCDMS HVeV phonon sensing detectors" [Phys. Rev. D 101, 031101\(R\) \(2020\)](#)
4. R. Agnese, et al. (SuperCDMS Collaboration), "Search for low-mass dark matter with CDMSlite using a profile likelihood fit" [Phys. Rev. D 99, 062001 \(2019\)](#)
3. R. Agnese, et al. (SuperCDMS Collaboration), "Production Rate Measurement of Tritium and Other Cosmogenic Isotopes in Germanium with CDMSlite" [Astropart. Phys. 104, 1-12 \(2019\)](#)
2. R. Agnese, et al. (SuperCDMS Collaboration), "Energy Loss Due to Defect Formation from Pb-206 Recoils in SuperCDMS Germanium Detectors" [Appl. Phys. Lett. 113, 092101 \(2018\)](#)
1. R. Agnese, et al. (SuperCDMS Collaboration), "First Dark Matter Constraints from a SuperCDMS Single-Charge Sensitive Detector" [Phys. Rev. Lett. 121, 051301 \(2018\)](#)