Kevin Zhou

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Employment and Education

UC Berkeley / Lawrence Berkeley National Lab from 2024
Postdoctoral Researcher

Stanford University 2024
PhD in Physics (advisor: Natalia Toro)

Oxford University (New College) 2019
MSc in Mathematical and Theoretical Physics with distinction

Cambridge University (St. John's College) 2018
MASt in Mathematics with distinction

Massachusetts Institute of Technology 2017
BS in Physics and Mathematics

Publications

Most of these works have alphabetical author lists; exceptions are indicated by underlining.

2507.07173 A Prototype Hybrid Mode Cavity for Heterodyne Axion Detection
Z. Li, K. Zhou, M. Oriunno, A. Berlin, S. Calatroni, R. T. D'Agnolo, S. A. R. Ellis, P. Schuster, S. Tantawi, N. Toro

2504.02927 Determining Spin-Dependent Light Dark Matter Rates from Neutron Scattering
A. Berlin, A. J. Millar, T. Trickle, K. Zhou

2502.01725 Ponderomotive Effects of Ultralight Dark Matter
K. Zhou, JHEP 05, 134 (2025)

2312.11601 Physical Signatures of Fermion-Coupled Axion Dark Matter
A. Berlin, A. J. Millar, T. Trickle, K. Zhou, JHEP 05, 314 (2024)

2303.04816 Interactions of Particles with "Continuous Spin" Fields
P. Schuster, N. Toro, K. Zhou, JHEP 04, 010 (2023)

2209.12901 Discovering QCD-Coupled Axion Dark Matter with Polarization Haloscopes
A. Berlin, K. Zhou, Phys. Rev. D 108, 035038 (2023)

2112.02104 Probing Invisible Vector Meson Decays with the NA64 and LDMX Experiments
P. Schuster, N. Toro, K. Zhou, Phys. Rev. D 105, 035036 (2022)

2106.09033 Stellar Shocks From Dark Matter Asteroid Impacts
A. Das, S. A. R. Ellis, P. Schuster, K. Zhou, Phys. Rev. Lett. 128, 021101 (2022)

2007.15656 Heterodyne Broadband Detection of Axion Dark Matter
A. Berlin, R. T. D'Agnolo, S. A. R. Ellis, K. Zhou, Phys. Rev. D 104, L111701 (2021)

1912.11048 Axion Dark Matter Detection by Superconducting Resonant Frequency Conversion
A. Berlin, R. T. D'Agnolo, S. A. R. Ellis, C. Nantista, J. Neilson,
P. Schuster, S. Tantawi, N. Toro, K. Zhou, JHEP 07, 088 (2020)

1704.06266 Casimir Meets Poisson: Improved Quark/Gluon Discrimination with Counting Observables
C. Frye, A. Larkoski, J. Thaler, K. Zhou, JHEP 09, 083 (2017)

1704.05456 Generalized Fragmentation Functions for Fractal Jet Observables
B. Elder, M. Procura, J. Thaler, W. Wallewijn, K. Zhou, JHEP 06, 085 (2017)

1703.04722 Minimum Energetic Cost to Maintain a Target Nonequilibrium State
J. Horowitz, K. Zhou, J. England, Phys. Rev. E 95, 042102 (2017)

Community White Papers

2203.14923 Axion Dark Matter
Contributed writing for a subsection, and editing for all sections

2203.08192 Current Status and Future Prospects for the Light Dark Matter eXperiment
Contributed theoretical projections for experimental sensitivity, and figures

2203.12714 Searches for New Particles, Dark Matter, and Gravitational Waves with SRF Cavities
Contributed writing and feedback

Other Works

– Physics Olympiad Handouts
Proto-textbook with 1,000 tricky solved problems, used by students in dozens of countries

2411.08283 The surprising subtlety of electrostatic field lines
K. Zhou and T. Brauner, Am. J. Phys. 93, 234–240 (2025)

2203.15821 Comment on "Poynting vector controversy in axion modified electrodynamics"

Fellowships and Awards

NSF Graduate Research Fellowship	2017 – 2022
Marshall Scholarship	2017 – 2019
Demuth Prize, New College	2019
Dirac Prize, St. John's College	2018
Finalist, Hertz Fellowship	2017
Joel Matthew Orloff Award for Outstanding Research, MIT	2017
Honorable Mention, Putnam Mathematical Competition	2016, 2017
Gold Medal, International Physics Olympiad	2012, 2013
Winner, USA Junior Mathematical Olympiad	2011

Seminars

How (Not) to Probe the Axion-Electron Coupling

UC Davis "Xperiment" Seminar	5/25
University of Chicago Particle Theory Seminar	4/25
UC Berkeley "4D" Seminar	8/24
Flatiron Institute, Particle Astrophysics and Cosmology Meeting Around NYC	4/24
University of Geneva High Energy Particle Physics Seminar	3/24
HEP/Astro Results Forum	3/24
SLAC Theory Seminar	11/23

Electromagnetism and Gravity with Continuous Spin

UIUC High Energy Physics Seminar	10/24
Hunting Invisibles (HIDDeN) Virtual Institute Seminar	11/23
Caltech High Energy Physics Seminar	10/23
UC Santa Cruz SCIPP Seminar	10/23
University of Maryland EPT Seminar	9/23
ICTP HECAP Seminar	7/23
CERN BSM Forum	6/23
UC Davis QMAP Particle/Cosmology Seminar	4/23
UC Berkeley "4D" Seminar	4/23
Stanford Phenomenology Seminar	2/23
Perimeter Institute Theory Seminar	10/22

Discovering the QCD Axion with Polarization Haloscopes

Fermilab Theory Seminar	4/23
TRIUMF Theory Seminar	10/22
University of Victoria Theory Seminar	10/22

Flashes in the Dark: New Searches for Axions and Macroscopic Dark Matter

Johns Hopkins Theory Seminar	9/22

Searching for Ultraheavy and Ultralight Dark Matter

SLAC Theory Seminar	3/22

Heterodyne Detection of Axion Dark Matter

Virtual Axion Institute	8/20

Conferences and Workshops

The Superconducting Heterodyne Approach to Axion Detection

Axions in Stockholm 2025	7/25
Berkeley Axion Workshop 2025 (invited)	5/25

Spin-Dependent Dark Matter Rates from Neutron Scattering

Phenomenology 2025 Symposium	5/25

Physical Signatures of Fermion-Coupled Axion Dark Matter

Phenomenology 2024 Symposium	5/24

Discovering the QCD Axion with Polarization Haloscopes

18th Patras Workshop on Axions, WIMPs and WISPs	7/23

Phenomenology 2023 Symposium 5/23

Probing Dark Sectors With Invisible Vector Meson Decays
Phenomenology 2022 Symposium 5/22
APS April Meeting 2022 4/22
ILC Workshop on Potential Experiments (ILCX2021) 10/21

Stellar Shocks From Dark Asteroids
24th International Conference on Particle Physics and Cosmology (COSMO'21) 8/21
APS Division of Particles & Fields Meeting (DPF21) 7/21
Phenomenology 2021 Symposium 5/21

Proposals

An SRF Cavity for Dark Matter Axion Detection 2022 – 2024

- SLAC LDRD grant, with principal investigator Zenghai Li
- Participated in design discussions, writing and editing of proposal and final publication

Outreach and Service

U.S. Physics Olympiad 2015 – 2024

- Wrote and edited the largest physics competition in the United States (6,000 participants)
- Taught classes on problem solving and lab skills to finalists at annual training camps
- Managed the theoretical training of the U.S. traveling team from 2021 to 2024

Physics StackExchange 2014 – 2020

- Wrote 1,000 answers for questions on all fields of physics, with 3 million total views

Press coverage 2022

- Participated in several interviews for "Stellar Shocks From Dark Matter Asteroid Impacts" (Altmetric score of 200+, in top 1% of Physical Review Letters)

National Science Bowl 2023 – 2024

- Wrote and edited physics questions for the U.S. Department of Energy's flagship middle school and high school outreach event (∼10,000 participants)

Department service

- Co-organized the Berkeley/LBNL particle theory seminar Spring+Fall 2025
- Served as student representative for the physics department's Graduate Studies Committee 2023
- Participated on various panels for undergraduates and incoming graduate students 2020

Local outreach

- Mentored a local undergraduate research intern Summer 2024
- Judged research presentations for the US Invitational Young Physicists Tournament 2023
- Taught high school students at "Splash" events at MIT, Oxford, and Stanford 2013 – 2019

Peer review

- Refereed research papers for *JHEP*, *Phys. Rev. D*, *Phys. Rev. Lett.*, and *Nature Communications*
- Refereed pegagogical papers and books for *Am. J. Phys.*, *Cambridge University Press*, and *World Scientific*

Teaching and Education

Humanity's Last Exam 2025

- Contributed tricky physics problems to help benchmark AI, interviewed in New York Times

Physics 230: Graduate Quantum Mechanics I 2024

Physics 120: Intermediate Electricity and Magnetism I 2023

Physics 330: Quantum Field Theory I 2022

- Ran weekly sections and office hours; helped write, edit, solve, and grade new problem sets