

Employment and Education

UC Berkeley / Lawrence Berkeley National Lab Postdoctoral Researcher	from 2024
Stanford University PhD in Physics (advisor: Natalia Toro)	2024
Oxford University (New College) MSc in Mathematical and Theoretical Physics with distinction	2019
Cambridge University (St. John's College) MASt in Mathematics with distinction	2018
Massachusetts Institute of Technology BS in Physics and Mathematics	2017

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

Publications

- 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

Solo-authored proto-textbook used by students in dozens of countries

- 2411.08283** The surprising subtlety of electrostatic field lines
K. Zhou and T. Brauner, to appear in Am. J. Phys.
- 2203.15821** Comment on "Poynting vector controversy in axion modified electrodynamics"

Talks

Physical Signatures of Fermion-Coupled Axion Dark Matter

UC Berkeley "4D" Seminar	8/24
Phenomenology 2024 Symposium	5/24
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

18th Patras Workshop on Axions, WIMPs and WISPs	7/23
Phenomenology 2023 Symposium	5/23
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
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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

Searching for Ultraheavy and Ultralight Dark Matter

SLAC Theory Seminar	3/22
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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

Heterodyne Detection of Axion Dark Matter

Virtual Axion Institute	8/20
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Proposals

An SRF Cavity for Dark Matter Axion Detection	2022 – 2024
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- SLAC LDRD grant, with principal investigator Zenghai Li
- Participated in design discussions, writing and editing of proposal and progress updates

Outreach and Service

U.S. Physics Olympiad	2015 – 2024
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- [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
- Directed the theoretical training of the U.S. traveling team from 2021 to 2024

Physics StackExchange	2014 – 2020
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- Wrote 1,000 [answers](#) for questions on all fields of physics, with 2.5 million total views

Press coverage	2022
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> Co-organized the Berkeley/LBNL particle theory seminar 	Spring 2025
<ul style="list-style-type: none"> Served as student representative for the physics department’s Graduate Studies Committee 	2023
<ul style="list-style-type: none"> Participated on various panels for undergraduates and incoming graduate students 	2020
Local outreach	
<ul style="list-style-type: none"> Mentored a local undergraduate for the DOE’s RENEW-HEP program 	Summer 2024
<ul style="list-style-type: none"> Judged research presentations for the US Invitational Young Physicists Tournament 	2023
<ul style="list-style-type: none"> Taught high school students at “Splash” events at MIT, Oxford, and Stanford 	2013 – 2019
Peer review	
<ul style="list-style-type: none"> Refereed research papers for <i>JHEP</i> and <i>Phys. Rev. D</i> Refereed pedagogical papers and books for <i>Am. J. Phys.</i>, <i>Cambridge University Press</i>, and <i>World Scientific</i> 	

Teaching and Education

Humanity's Last Exam	2025
<ul style="list-style-type: none"> Contributed some tough 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
<ul style="list-style-type: none"> Ran weekly sections and office hours; helped write, edit, solve, and grade new problem sets 	