

Education

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

- 2203.15821** Comment on “Poynting vector controversy in axion modified electrodynamics”
- [Physics Olympiad Handouts](#)
Solo-authored proto-textbook used by students in dozens of countries

Talks

[Physical Signatures of Fermion-Coupled Axion Dark Matter](#)

Flatiron Institute, Particle Astrophysics and Cosmology Meeting Around NYC	4/24
University of Geneva Particle Physics Seminar	3/24
HEP/Astro Results Forum	3/24
SLAC Theory Seminar	11/23

[Electromagnetism and Gravity with Continuous Spin](#)

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

- 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 – present

- [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
- Served as deputy leader of the U.S. delegation for the 2023 International Physics Olympiad

Physics StackExchange

2014 – 2020

- Wrote 1,000 [answers](#) for questions on all fields of physics, with over 2 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

2022 – 2023

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

Local outreach and department activities

- Served as student representative for the physics department's Graduate Studies Committee 2023
- Judged research presentations for the US Invitational Young Physicists Tournament 2023
- Participated on various panels for undergraduates and incoming graduate students 2020
- Presented ~ 10 papers at Stanford and SLAC journal clubs 2020 – 2022
- Taught high school students at “Splash” events at MIT, Oxford, and Stanford 2013 – 2019

Peer review

- Refereed research papers for *JHEP* and *Phys. Rev. D*
- Refereed pedagogical papers and books for *Am. J. Phys.* and *World Scientific*

Teaching

- 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