

## Education

<b>Stanford University</b> PhD in Physics (advisor: Natalia Toro)	June 2024 (expected)
<b>Oxford University</b> (New College) MSc in Mathematical and Theoretical Physics with distinction	2019
<b>Cambridge University</b> (St. John's College) MASt in Mathematics with distinction	2018
<b>Massachusetts Institute of Technology</b> 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

- [The Axion-Electron Coupling: Prospects and Pitfalls](#)  
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](#)
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|---|------|
| 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
<a href="#">Flashes in the Dark: New Searches for Axions and Macroscopic Dark Matter</a> Johns Hopkins Theory Seminar	9/22
<a href="#">Probing Dark Sectors With Invisible Vector Meson Decays</a> Phenomenology 2022 Symposium	5/22
APS April Meeting 2022	4/22
ILC Workshop on Potential Experiments (ILCX2021)	10/21
<a href="#">Searching for Ultraheavy and Ultralight Dark Matter</a> SLAC Theory Seminar	3/22
<a href="#">Stellar Shocks From Dark Asteroids</a> 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
<a href="#">Heterodyne Detection of Axion Dark Matter</a> Virtual Axion Institute	8/20

## Proposals

<a href="#">An SRF Cavity for Dark Matter Axion Detection</a>	2022 – 2024
<ul style="list-style-type: none"> <li>• SLAC LDRD grant, with principal investigator Zenghai Li</li> <li>• Participated in design discussions, writing and editing of proposal and progress updates</li> </ul>	

## Outreach and Service

U.S. Physics Olympiad	2015 – present
<ul style="list-style-type: none"> <li>• <a href="#">Wrote and edited</a> the largest physics competition in the United States (6,000 participants)</li> <li>• Taught classes on problem solving and lab skills to finalists at annual training camps</li> <li>• Served as deputy leader of the U.S. delegation for the 2023 International Physics Olympiad</li> </ul>	
Physics StackExchange	2014 – 2020
<ul style="list-style-type: none"> <li>• Wrote 1,000 <a href="#">answers</a> for questions on all fields of physics, with over 2 million total views</li> </ul>	
Press coverage	2022
<ul style="list-style-type: none"> <li>• Participated in several interviews for “Stellar Shocks From Dark Matter Asteroid Impacts” (Altmetric score of 200+, in top 1% of Physical Review Letters)</li> </ul>	
National Science Bowl	2022 – 2023
<ul style="list-style-type: none"> <li>• Wrote and edited physics questions for the U.S. Department of Energy’s flagship middle school and high school outreach event (~10,000 participants)</li> </ul>	
Local outreach and department activities	
<ul style="list-style-type: none"> <li>• Served as student representative for the physics department’s Graduate Studies Committee</li> <li>• Judged research presentations for the US Invitational Young Physicists Tournament</li> </ul>	
	2023
	2023

- Participated on various panels for undergraduates and incoming graduate students 2020
- Presented  $\sim 10$  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