

Shuyang Cao | Résumé

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Research Interest

Nonequilibrium Dynamics, Dark Matter, Gravitational Wave, Quantum Information

Education

University of Pittsburgh **Pittsburgh**
Ph.D. in *Physics* *Aug. 2019 – present*
GPA 3.983/4
Advisor: Prof. [Adam K Leibovich](#), Prof. [Daniel Boyanovsky](#)

University of Pittsburgh **Pittsburgh**
M.S. in *Physics* *Aug. 2019 – May. 2020*

Peking University **Beijing**
B.S. in *Electronic and Information Science and Technology* *Sep. 2014 – Jul. 2018*
Advisor: Prof. [Xiaoji Zhou](#)

Hong Kong University of Science and Technology **Hong Kong**
Non-degree Undergraduate Exchange Program *Sep. 2016 – Dec. 2016*
TGA: 4.060/4.3

Summer Schools

51st SLAC Summer Institute (SSI 2023) **SLAC**
Program topic : Maching learning across the frontiers *Aug. 718, 2023*
Poster presentation : Dynamics of Neutral (pseudo-)scalar Field Mixing

Qiskit Global Summer School 2023 **IBM**
Program topic : Theory To Implementation *Jul. 17-28, 2023*
Certification : Qiskit Global Summer School 2023 - Quantum Excellence 🏆

The 3rd Condensed Matter Summer School **University of Minnesota**
Program topic : Dynamics and Quantum Information in Many-body Systems *Jun. 12-21, 2023*
Poster presentation : Axionic Responses in Materials Meet Cosmic Axions

Michigan Cosmology Summer School 2023 **Univeresity of Michigan**
Jun. 5-9, 2023

Selected Honors and Awards

Andrew W. Mellon Predoctoral Fellow **Academic year 2023-2024**
University-wide fellowship awarded to doctoral students of exceptional promise and ability across the disciplines.

Dietrich School of Arts and Sciences Summer Fellowship **Summer. 2020**
awarded to top first-year graduate students in good academic standing

Talks and Presentations

2023 Annual Meeting of the APS Mid-Atlantic Section <i>Title : Field Mixing of Axions in Early Universe and in Condensed Matter</i>	Newark, US Nov. 4, 2023
Phenomenology 2023 Symposium <i>Title : Imprints of Axion's Evolution in CMB</i>	Pittsburgh, U.S. May 9, 2023
APS April Meeting 2023 <i>Title : Brownian Axion-like Particles in Cosmic Microwave Background</i>	Online Apr. 25, 2023
The 5th Neighborhood Workshop at Penn State University <i>Title : Chern-Simons Condensate from Misaligned Axions</i>	State College, U.S. Apr. 6, 2023
2022 Annual Meeting of the APS Mid-Atlantic Section <i>Title : Brownian Axion-like Particles</i>	State College, U.S. Dec. 3, 2022

Teaching Assistant

- Introduction to Laboratory Physics, Fall 2019, University of Pittsburgh
- Introduction to Laboratory Physics, Spring 2020, University of Pittsburgh
- Introduction to Laboratory Physics, Fall 2020, University of Pittsburgh
- Introduction to Laboratory Physics, Spring 2021, University of Pittsburgh
- Introduction to Physics 1, Summer 2021, University of Pittsburgh
- Introduction to Laboratory Physics, Fall 2021, University of Pittsburgh
- Introduction to Laboratory Physics, Spring 2022, University of Pittsburgh
- Introduction to Laboratory Physics, Lead TA, Fall 2022, University of Pittsburgh

Publications

- [1] **Shuyang Cao**. “Oscillations of density and coherence in field mixing”. In: (to be submitted).
- [2] **Shuyang Cao**, Mehbub Khan, Arnab Dasgupta, Zixin Yang, and Adam K Leibovich. “The Memory Term from Effective Field Theory”. In: (in progress).
- [3] Nathan Herring, **Shuyang Cao**, and Daniel Boyanovsky. “Is the effective potential, effective for dynamics?” In: (Mar. 2024). arXiv: [2403.07084](https://arxiv.org/abs/2403.07084) [[hep-ph](#)].
- [4] **Shuyang Cao** and Daniel Boyanovsky. “Effective field theory of particle mixing”. In: *Phys. Rev. D* 109 (3 Feb. 2024), p. 036038. DOI: [10.1103/PhysRevD.109.036038](https://doi.org/10.1103/PhysRevD.109.036038).
- [5] **Shuyang Cao**, Wenjie Huang, and Daniel Boyanovsky. “Dynamics of axion-neutral pseudoscalar mixing”. In: *Phys. Rev. D* 108 (2 July 2023), p. 025012. DOI: [10.1103/PhysRevD.108.025012](https://doi.org/10.1103/PhysRevD.108.025012).
- [6] **Shuyang Cao** and Daniel Boyanovsky. “Chern Simons condensate from misaligned axions”. In: *Phys. Rev. D* 107 (8 Apr. 2023), p. 083531. DOI: [10.1103/PhysRevD.107.083531](https://doi.org/10.1103/PhysRevD.107.083531).
- [7] **Shuyang Cao** and Daniel Boyanovsky. “Nonequilibrium dynamics of axionlike particles: The quantum master equation”. In: *Phys. Rev. D* 107 (6 Mar. 2023), p. 063518. DOI: [10.1103/PhysRevD.107.063518](https://doi.org/10.1103/PhysRevD.107.063518).
- [8] **Shuyang Cao** and Daniel Boyanovsky. “Brownian axionlike particles”. In: *Phys. Rev. D* 106 (12 Dec. 2022), p. 123503. DOI: [10.1103/PhysRevD.106.123503](https://doi.org/10.1103/PhysRevD.106.123503).
- [9] **Shuyang Cao**, Pengju Tang, Xinxin Guo, Xuzong Chen, Wei Zhang, and Xiaoji Zhou. “Extraction and identification of noise patterns for ultracold atoms in an optical lattice”. In: *Opt. Express* 27.9 (Apr. 2019), pp. 12710–12722. DOI: [10.1364/OE.27.012710](https://doi.org/10.1364/OE.27.012710).

- [10] Dong Hu, Lin-Xiao Niu, Jia-Hua Zhang, Xin-Hao Zou, **Shu-Yang Cao**, and Xiao-Ji Zhou. “Coupled Two-Dimensional Atomic Oscillation in an Anharmonic Trap”. In: *Chinese Physics Letters* 34.7 (July 2017), p. 076701. DOI: [10.1088/0256-307x/34/7/076701](https://doi.org/10.1088/0256-307x/34/7/076701).