

Shuyang Cao | Résumé

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Research Interest

Nonequilibrium Dynamics, Dark Matter, Gravitational Wave, Quantum Information

Education

University of Pittsburgh

Ph.D. in *Physics*

GPA 3.983/4

Advisor: Prof. Adam K Leibovich, Prof. Daniel Boyanovsky

Pittsburgh

Aug. 2019 – present

University of Pittsburgh

M.S. in *Physics*

Pittsburgh

Aug. 2019 – May. 2020

Peking University

B.S. in *Electronic and Information Science and Technology*

Advisor: Prof. Xiaoji Zhou

Beijing

Sep. 2014 – Jul. 2018

Hong Kong University of Science and Technology

Non-degree Undergraduate Exchange Program

TGA: 4.060/4.3

Hong Kong

Sep. 2016 – Dec. 2016

Summer Schools

51st SLAC Summer Institute (SSI 2023)

Program topic : *Maching learning across the frontiers*

Poster presentation : *Dynamics of Neutral (pseudo-)scalar Field Mixing*

SLAC

Aug. 718, 2023

Qiskit Global Summer School 2023

Program topic : *Theory To Implementation*

Certification : *Qiskit Global Summer School 2023 - Quantum Excellence* 🏆

IBM

Jul. 17-28, 2023

The 3rd Condensed Matter Summer School

Program topic : *Dynamics and Quantum Information in Many-body Systems*

Poster presentation : *Axionic Responses in Materials Meet Cosmic Axions*

University of Minnesota

Jun. 12-21, 2023

Michigan Cosmology Summer School 2023

Univeresity of Michigan

Jun. 5-9, 2023

Selected Honors and Awards

PITT PACC Fellowship

Departmental fellowship based on excellence in research and scholarship

Academic year 2024-2025

Andrew W. Mellon Predoctoral Fellow

University-wide fellowship awarded to doctoral students of exceptional promise and ability across the disciplines.

Academic year 2023-2024

Talks and Presentations

APS DPF Meeting & Phenomenology Symposium 2024 <i>Title :Field mixing in thermal background: a quantum master equation method</i>	Pittsburgh, U.S. <i>May 16, 2024</i>
The 6th Neighborhood Workshop at Penn State University <i>Title : Is the effective potential, effective for dynamics?</i>	State College, U.S. <i>Apr. 25, 2024</i>
APS April Meeting 2024 <i>Title : Scalar field mixing induced by common intermediate states</i>	Sacramento, US <i>Apr. 3, 2024</i>
APS March Meeting 2024 <i>Title : Harnessing synthetic axions to probe a cosmological axion</i>	Minneapolis, US <i>Mar. 6, 2024</i>
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 <i>Nov. 4, 2023</i>
Phenomenology 2023 Symposium <i>Title : Imprints of Axion's Evolution in CMB</i>	Pittsburgh, U.S. <i>May 9, 2023</i>
APS April Meeting 2023 <i>Title : Brownian Axion-like Particles in Cosmic Microwave Background</i>	Online <i>Apr. 25, 2023</i>
The 5th Neighborhood Workshop at Penn State University <i>Title : Chern-Simons Condensate from Misaligned Axions</i>	State College, U.S. <i>Apr. 6, 2023</i>
2022 Annual Meeting of the APS Mid-Atlantic Section <i>Title : Brownian Axion-like Particles</i>	State College, U.S. <i>Dec. 3, 2022</i>

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: *Phys. Rev. D* 109 (10 May 2024), p. 105021. DOI: [10.1103/PhysRevD.109.105021](https://doi.org/10.1103/PhysRevD.109.105021). 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).