Shuyang Cao | Résumé

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Education

University of Pittsburgh — **Pittsburgh**
Ph.D. in *Physics* — *Aug. 2019 – present*
Advisor: Prof. Adam K Leibovich, Prof. Daniel Boyanovsky

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*

Selected Honors and Awards

PITT PACC Fellowship — **Academic year 2024-2025**
Departmental fellowship based on excellence in research and scholarship

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

Invited Talk at Prof. Nora Brambilla' Group of TUM — **Online**
Title : Is the effective potential, effective for dynamics? — *May 29, 2024*

APS DPF Meeting & Phenomenology Symposium 2024 — **Pittsburgh, U.S.**
Title :Field mixing in thermal background: a quantum master equation method — *May 16, 2024*

The 6th Neighborhood Workshop at Penn State University — **State College, U.S.**
Title : Is the effective potential, effective for dynamics? — *Apr. 25, 2024*

APS April Meeting 2024 — **Sacramento, US**
Title : Scalar field mixing induced by common intermediate states — *Apr. 3, 2024*

APS March Meeting 2024 — **Minneapolis, US**
Title : Harnessing synthetic axions to probe a cosmological axion — *Mar. 6, 2024*

2023 Annual Meeting of the APS Mid-Atlantic Section — **Newark, US**
Title : Field Mixing of Axions in Early Universe and in Condensed Matter — *Nov. 4, 2023*

Phenomenology 2023 Symposium — **Pittsburgh, U.S.**
Title : Imprints of Axion's Evolution in CMB — *May 9, 2023*

APS April Meeting 2023 — **Online**
Title : Brownian Axion-like Particles in Cosmic Microwave Background — *Apr. 25, 2023*

The 5th Neighborhood Workshop at Penn State University — **State College, U.S.**
Title : Chern-Simons Condensate from Misaligned Axions — *Apr. 6, 2023*

2022 Annual Meeting of the APS Mid-Atlantic Section — **State College, U.S.**
Title : Brownian Axion-like Particles — *Dec. 3, 2022*

Publications

[1] ***S. Cao***, M. Khan, A. Dasgupta, Z. Yang, and A. K. Leibovich, "The memory term from effective field theory," in progress.

[2] ***S. Cao*** and D. Boyanovsky, "Condensate decay in a radiation dominated cosmology," *Phys. Rev. D*, vol. 111, p. 063 530, 6 Mar. 2025. DOI: 10.1103/PhysRevD.111.063530.

[3] N. Herring, ***S. Cao***, and D. Boyanovsky, "Is the finite temperature effective potential effective for dynamics?" *Phys. Rev. D*, vol. 111, p. 016 028, 1 Jan. 2025. DOI: 10.1103/PhysRevD.111.016028.

[4] ***S. Cao***, "Field mixing in a thermal medium: A quantum master equation approach," Aug. 2024. arXiv: 2408.08460 [quant-ph].

[5] N. Herring, ***S. Cao***, and D. Boyanovsky, "Is the effective potential effective for dynamics?" *Phys. Rev. D*, vol. 109, p. 105 021, 10 May 2024. DOI: 10.1103/PhysRevD.109.105021.

[6] ***S. Cao*** and D. Boyanovsky, "Effective field theory of particle mixing," *Phys. Rev. D*, vol. 109, p. 036 038, 3 Feb. 2024. DOI: 10.1103/PhysRevD.109.036038.

[7] ***S. Cao***, W. Huang, and D. Boyanovsky, "Dynamics of axion-neutral pseudoscalar mixing," *Phys. Rev. D*, vol. 108, p. 025 012, 2 Jul. 2023. DOI: 10.1103/PhysRevD.108.025012.

[8] ***S. Cao*** and D. Boyanovsky, "Chern simons condensate from misaligned axions," *Phys. Rev. D*, vol. 107, p. 083 531, 8 Apr. 2023. DOI: 10.1103/PhysRevD.107.083531.

[9] ***S. Cao*** and D. Boyanovsky, "Nonequilibrium dynamics of axionlike particles: The quantum master equation," *Phys. Rev. D*, vol. 107, p. 063 518, 6 Mar. 2023. DOI: 10.1103/PhysRevD.107.063518.

[10] ***S. Cao*** and D. Boyanovsky, "Brownian axionlike particles," *Phys. Rev. D*, vol. 106, p. 123 503, 12 Dec. 2022. DOI: 10.1103/PhysRevD.106.123503.

[11] ***S. Cao***, P. Tang, X. Guo, X. Chen, W. Zhang, and X. Zhou, "Extraction and identification of noise patterns for ultracold atoms in an optical lattice," *Opt. Express*, vol. 27, no. 9, pp. 12 710–12 722, Apr. 2019. DOI: 10.1364/OE.27.012710.

[12] D. Hu, L.-X. Niu, J.-H. Zhang, X.-H. Zou, ***S.-Y. Cao***, and X.-J. Zhou, "Coupled two-dimensional atomic oscillation in an anharmonic trap," *Chinese Physics Letters*, vol. 34, no. 7, p. 076 701, Jul. 2017. DOI: 10.1088/0256-307x/34/7/076701.

Summer Schools

PiTP 2024 & PSSCMP 2024 — **Institute for Advanced Study**
Program topics: Quantum Matter, Superconductivity, Topology and Correlations — *Jul. 8-26, 2024*

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**
Program topic: interface of data and theory — *Jun. 5-9, 2023*