

Shuyang Cao | Résumé

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Education

University of Pittsburgh Ph.D. in <i>Physics</i> Advisor: Prof. Adam K Leibovich , Prof. Daniel Boyanovsky	Pittsburgh Aug. 2019 – present
Peking University B.S. in <i>Electronic and Information Science and Technology</i> Advisor: Prof. Xiaoji Zhou	Beijing Sep. 2014 – Jul. 2018
Hong Kong University of Science and Technology <i>Non-degree Undergraduate Exchange Program</i>	Hong Kong Sep. 2016 – Dec. 2016

Selected Honors and Awards

PITT PACC Fellowship <i>Departmental fellowship based on excellence in research and scholarship</i>	Academic year 2024-2025
Andrew W. Mellon Predoctoral Fellow <i>University-wide fellowship awarded to doctoral students of exceptional promise and ability across the disciplines.</i>	Academic year 2023-2024
Dietrich School of Arts and Sciences Summer Fellowship <i>awarded to top first-year graduate students in good academic standing</i>	Summer. 2020

Talks and Presentations

Invited Talk at Prof. Nora Brambilla' Group of TUM <i>Title : Is the effective potential, effective for dynamics?</i>	Online May 29, 2024
APS DPF Meeting & Phenomenology Symposium 2024 <i>Title :Field mixing in thermal background: a quantum master equation method</i>	Pittsburgh, U.S. May 16, 2024
The 6th Neighborhood Workshop at Penn State University <i>Title : Is the effective potential, effective for dynamics?</i>	State College, U.S. Apr. 25, 2024
APS April Meeting 2024 <i>Title : Scalar field mixing induced by common intermediate states</i>	Sacramento, US Apr. 3, 2024
APS March Meeting 2024 <i>Title : Harnessing synthetic axions to probe a cosmological axion</i>	Minneapolis, US Mar. 6, 2024
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

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**, “Field mixing in a thermal medium: A quantum master equation approach,” *Journal of High Energy Physics*, vol. 2025, no. 6, p. 216, Jun. 2025. arXiv: [2408.08460 \[quant-ph\]](#).
- [3] **S. Cao** and D. Boyanovsky, “Condensate decay in a radiation dominated cosmology,” *Phys. Rev. D*, vol. 111, p. 063530, 6 Mar. 2025. DOI: [10.1103/PhysRevD.111.063530](#).
- [4] N. Herring, **S. Cao**, and D. Boyanovsky, “Is the finite temperature effective potential effective for dynamics?” *Phys. Rev. D*, vol. 111, p. 016028, 1 Jan. 2025. DOI: [10.1103/PhysRevD.111.016028](#).
- [5] N. Herring, **S. Cao**, and D. Boyanovsky, “Is the effective potential effective for dynamics?” *Phys. Rev. D*, vol. 109, p. 105021, 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. 036038, 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. 025012, 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. 083531, 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. 063518, 6 Mar. 2023. DOI: [10.1103/PhysRevD.107.063518](#).
- [10] **S. Cao** and D. Boyanovsky, “Brownian axionlike particles,” *Phys. Rev. D*, vol. 106, p. 123503, 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. 12710–12722, 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. 076701, Jul. 2017. DOI: [10.1088/0256-307x/34/7/076701](#).

Summer Schools

PiTP 2024 & PSSCMP 2024

Program topics: Quantum Matter, Superconductivity, Topology and Correlations

Institute for Advanced Study

Jul. 8-26, 2024

51st SLAC Summer Institute (SSI 2023)

Program topic : Machine learning across the frontiers


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

SLAC

Aug. 7-18, 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

Program topic: interface of data and theory

University of Michigan

Jun. 5-9, 2023