NAN CHENG

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EDUCATION

University of Michigan, Ann Arbor — Ann Arbor, MI, USA
Ph.D. in Physics — Aug. 2025
M.S. in Mathematics — Aug. 2025

- GPA 4.00/4.00; advised by Prof. Xiaoming Mao and Prof. Kai Sun

Fudan University — Shanghai, China
B.S. with Honors in Physics — June 2019

- GPA 3.72/4.00, Ranking 4/103; Outstanding Graduate of Fudan University

EMPLOYMENT

Bohr & Plank Lab, Huawei — Shanghai, China
Incoming Research Scientist — Starting Dec. 2026

Georgia Institute of Technology — Atlanta, GA, USA
Postdoctoral Fellow — Sept. 2025 – Aug. 2026

AWARDS

Emerging Soft Matter Excellence Award Finalist (APS DSOFT) — *Mar. 2025*
Top Talent Program in Basic Sciences (Ministry of Education, China), Fudan University — *June 2017/2018/2019*

PUBLICATIONS

1. ***Lyapunov exponents explain disorder-induced polarization and soliton teleportation in a mechanical Markov system,***
Will Stephenson, **Nan Cheng,** Kai Sun, and Xiaoming Mao
Nature Communications **17** (1), 10421 (2026)

2. ***Frustrated assembly of nanoscale bipyramids into uniquely ordered superstructures,***
Daniel García-Lojo, **Nan Cheng,** Tim Moore, Rafael Contreras-Cáceres, Qiongyang Chen, Eva Bladt, Benito Rodríguez-González, Jorge Perez-Juste, Kai Sun, Sara Bals, Luis Liz-Marzán, Sharon Glotzer, Xiaoming Mao, Nicholas Kotov, and Isabel Pastoriza-Santos
ACS Nano **20** (34), 23729–23739, (2026)

3. ***Viscoelastic topological mechanical metamaterial for broadband vibration isolation,***
Fan Liu, **Nan Cheng,** James McInerney, Ellen Arruda, Xiaoming Mao, and Zi Chen
Journal of the Mechanics and Physics of Solids **214**, 106690, (2026)

4. ***Observation of mechanical kink control and generation via acoustic waves,***
Kai Qian, **Nan Cheng,** Francesco Serafin, Kai Sun, Georgios Theocharis, Xiaoming Mao, and Nicholas Boechler
Nature Communications **17** (1), 2428, (2026)

5. ***Rethinking fine-tuning when scaling test-time compute: limiting confidence improves mathematical reasoning,***
Feng Chen, Allan Raventós, **Nan Cheng,** Surya Ganguli, and Shaul Druckmann
Advances in Neural Information Processing Systems **38**, 158785-158818, (2025)

6. ***Regeneration leads to global tissue rejuvenation in aging sexual planarians,***
Xiaoting Dai, Xinghua Li, Alexander Tyshkovskiy, Cassandra Zuckerman, **Nan Cheng**, Peter Lin, David Paris, Saad Qureshi, Xiaoming Mao, Jayakrishnan Nandakumar, Vadim Gladyshev, Scott Pletcher, Leonid Kruglyak, Jacob Sobota, and Longhua Guo
Nature Aging **5** (5), 780-798, (2025)

7. ***Backscattering-free edge states below all bands in two-dimensional auxetic media,***
Wenting Cheng*, Kai Qian*, **Nan Cheng***, Nicholas Boechler, Xiaoming Mao, and Kai Sun
Nature Communications **16** (1), 2373, (2025) (* Equal contribution)

8. ***Geometrically frustrated self-assembly of hyperbolic crystals from icosahedral nanoparticles,***
Nan Cheng, Kai Sun, and Xiaoming Mao
Physical Review E **110** (5), 054132, (2024)

9. ***Universal spectral moment theorem and its applications in non-Hermitian systems,***
Nan Cheng, Chang Shu, Kai Zhang, Xiaoming Mao, and Kai Sun
Physical Review Letters **133** (21), 216401, (2024)

10. ***Band theory and boundary modes of high-dimensional representations of infinite hyperbolic lattices,***
Nan Cheng, Francesco Serafin, James McInerney, Zeb Rocklin, Kai Sun, and Xiaoming Mao
Physical Review Letters **129** (8), 088002, (2022)

PREPRINTS

1. ***Nonlinear curvature-free periodic folding in origami via symmetry classification of linear modes,***
Nan Cheng, Leon M Kamp, Yanxin Feng, Wenqian Sun, Katia Bertoldi, and Zeb Rocklin
arXiv:2610.08635 (2026)

2. ***Programmable non-Hermitian synchronization of light on a silicon photonic processor,***
Ze-Sheng Xu†, **Nan Cheng**†, Mohammed S. Elmusrati, Rohan Yadgirkar, Andrea Cataldo, Rui Wen, Govind Krishna, Jun Gao†, and Ali W. Elshaari†.
arXiv:2605.14653 (2026) († Corresponding Author)

3. ***Observation of universal spectral moments and moment-controlled wave dynamics,***
Jiaxin Zhong, Chang Shu, **Nan Cheng,** Jee Woo Kim, Kai Zhang, Kai Sun, and Yun Jing.
arXiv:2604.27585 (2026)

4. ***Failure of the Goldstone theorem for vector fields and boundary-mode proliferation in hyperbolic lattices,***
Daniel Sela*, **Nan Cheng***, and Kai Sun
arXiv:2511.16328 (2025) (* Equal contribution)

INVITED TALKS

- **Seminar at Department of Physics, Fudan University, Shanghai, China (2024)**
Universal spectral moment theorem and its applications in non-Hermitian systems
- **Microstructured Quantum Matter Seminar at Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany (2024)**
Real space curvature effect on wave propagation
- **Talk at the Society for Industrial and Applied Mathematics Conference on Material Science, Pittsburgh, PA, USA (2024)**
Band theory and boundary modes of high-dimensional representations of infinite hyperbolic lattices

CONTRIBUTED TALKS

- **Talk at the ICAM Workshop on Frustrated Assemblies, Ann Arbor, MI (2025)**
Geometrically frustrated self-assembly of hyperbolic crystals from icosahedral nanoparticles
- **Talk at the APS March Meeting, Anaheim, CA (2025)**
Backscattering-free edge states below all bands in two-dimensional auxetic media
- **Talk at the APS March Meeting, Minneapolis, MN (2024)**
Universal spectral moment theorem and its applications in non-Hermitian systems
- **Talk at Complex Mechanical Metamaterials Workshop, Ann Arbor, MI (2023)**
Band theory and boundary modes of high-dimensional representations of infinite hyperbolic lattices
- **Talk at the APS March Meeting, Las Vegas, NV (2023)**
Frustrated self-assembly of hyperbolic crystal from icosahedron shaped nanoparticles
- **CM-AMO Double Feature Seminar, Ann Arbor, MI (2022)**
Band theory and boundary modes of high-dimensional representations of infinite hyperbolic lattices
- **Talk at the APS March Meeting, Chicago, IL (2022)**
Hyperbolic lattice waves, band theory and boundary modes of high-dimensional representations of infinite hyperbolic lattice

TEACHING EXPERIENCE

Research Mentor, NSF REU Program — University of Michigan, Summer 2023 & Summer 2024
General Physics Lab — Fall 2019, Spring 2020, Fall 2020, Spring 2021