

# HAINA WANG

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## EDUCATION AND PROFESSIONAL TRAINING

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<b>University of Pennsylvania</b> <i>Postdoctoral Research Fellow</i> . Advisors: Andrea J. Liu and John C. Crocker Current research interests: Physical learning and network theory in biology	2024.9.1 - present
<b>Princeton University</b> <i>PhD candidate, Chemistry</i> . Thesis advisor: Salvatore Torquato Thesis title: <i>Inverse and Forward Problems in Statistical Mechanics: Classical and Quantum Systems</i> Graduate Certificate in Computational Science and Engineering	2020.5 - 2024.8
<b>Princeton University</b> <i>Master of Art, Chemistry</i>	2018.8 - 2020.5
<b>National University of Singapore</b> <i>Bachelor of Science, Chemistry and Mathematics</i> , GPA 4.92/5	2014.8 - 2018.7
<b>Technical University of Munich</b> <i>Exchange program, Chemistry</i>	2016.4 - 2016.10

## TECHNICAL SKILLS

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<b>Programming:</b>	Julia, Java, Python, C++, FORTRAN
<b>Skills:</b>	Cell biology modeling, Monte Carlo and Molecular Dynamics simulations, DeepMD, Gaussian, GPU programming with CUDA, Multithreading and SIMD
<b>Other Software &amp; Tools:</b>	Inkscape, Mathematica, POV-Ray, SLURM (HPC), xmGrace
<b>Languages:</b>	Chinese, English, French, German, knowledge in Spanish

## ONGOING RESEARCH PROJECTS

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- Rigidity homeostasis of actin networks emerging from mechano-sensitive filament and crosslinker dynamics; Collaborators: Marco A. Galvani Cunha (Penn)
- Chromosome copy number variances in cancers: A physical learning perspective. Submitted to PNAS. Collaborator: Dennis Discher (Penn)
- Hyperuniformity underlying structural color of birds and bacteria; Collaborator: Alison Sweeney, Allison Culbert (Yale)
- ElasticNetworks.jl: Julia package for exact linear response of elastic networks via automatic differentiation
- Chiral biofilament polymerization: A coarse-grained self-assembly approach

## PROFESSIONAL SERVICES

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- Guest editor** for *PRX Life*'s special edition "Adaptation and Learning in Biological Systems".
- Peer review referee** for *J. Phys. Condens. Matter*, *Phys. Chem. Chem. Phys.*, *J. Phys. Chem. Lett.*, *J. Open Source Softw.*, *Phys. D*, *Front. Phys.*
- Focus Session Organizer** for Division of Biological Physics, APS Global Physics Summit 2026. "Networks and Graphs in Biology: Topology, Geometry and Functions"
- Roles at Penn**
- Organizer for Soft Matter Theory Seminar Series.
  - Organizer for Materials Research Science and Engineering Centers (MRSEC) trainee sessions.
  - Lecturer for selected classes of PHYS1230: Principles of Physics III: Thermal Physics and Waves and PHYS6612: Advanced Statistical Mechanics. Experience with flipped classroom.
  - High performance computing specialist, in charge of Phase I testing of Penn's new PARCC cluster.
- Roles at Princeton**
- As University Administrative Fellow, created the pioneering seminar/workshop series Voices of STEM, a creativity-focused science communications miniseries for early career scientists and engineers.
  - Teaching assistant for CHM 202: General Chemistry II and CHM 207: Advanced General Chem: Materials Chem.

## Mentorships

Sam Dawley (Princeton), Adam Hitin-Bialus (Formerly undergrad at Princeton, now grad student at Tel-Aviv University), Shaobing Yuan (Princeton), Nadia Awad (Formerly undergrad at Penn, now grad student at Princeton, NSF graduate fellow), Suman Kulkarni (Penn), Yue Shang (Penn)

**Volunteering teacher** at Philadelphia Technician Training Institute and for incarcerated or formerly incarcerated individuals with the Petey Greene Program, Philadelphia.

## PUBLICATIONS

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- **H. Wang** and S. Torquato, *Phys. Rev. Research*, 6, 043124 (2024), “Can one hear the shape of a crystal?”.
- **H. Wang**, R. Samajdar, and S. Torquato, *Phys. Rev. B*, 110, 104201 (2024), “Correlations in interacting electron liquids: Many-body statistics and hyperuniformity”.
- **H. Wang**, D. A. Huse and S. Torquato, *The J. Chem. Phys.*, 161 074106 (2024), “Hole statistics of equilibrium 2D and 3D hard-sphere crystals”.
- **H. Wang** and S. Torquato, *J. Chem. Phys.* 160, 044991 (2024), “Designer Pair Statistics of Disordered Many-Particle Systems with Novel Properties”.
- **H. Wang** and S. Torquato, *Soft Matter*, 19, 550-564 (2023). “Equilibrium States Corresponding to Hyperuniform Nonequilibrium Pair Statistics”.
- **H. Wang**, F. H. Stillinger, and S. Torquato, *J. Chem. Phys.*, 157, 224106 (2022). “Realizability of Iso- $g_2$  Processes via Effective Pair Interactions”.
- S. Torquato and **H. Wang**, *Phys. Rev. E*, 106, 044122 (2022). “Precise Determination of Pair Interactions from Pair Statistics of Many-Body Systems In and Out of Equilibrium”. Our research package *InverseStatMech.jl* is officially registered in Julia Registry.
- **H. Wang** and S. Torquato, *Phys. Rev. Applied* 17, 034022 (2022). “Dynamic Measure of Hyperuniformity and Nonhyperuniformity in Heterogeneous Media via the Diffusion Spreadability”. (*Editor’s suggestion*)
- **H. Wang**, F. H. Stillinger, and S. Torquato, *J. Chem. Phys.* 153, 124106 (2020). “Sensitivity of Pair Statistics on Pair Potentials in Many-Body Systems”.
- **H. Wang** and R. P. A. Bettens, *Phys. Chem. Chem. Phys.*, 21, 4513-4522 (2019). “Modelling Potential Energy Surfaces for Small Clusters Using Shepard Interpolation with Gaussian-form Nodal Functions”.
- **H. Wang**, *The Magic of Muggles: Exploring Life Sciences*, China Machine Press, Beijing (2019).
- **H. Wang**, *Singapore Mathematical Medley*, (Jan 2016). “What are Numbers and What Should They Be: A Journey Backward”. Book review of R. Dedekind, *Was Sind und Was Sollen die Zahlen* (1888).

## CONFERENCE PRESENTATIONS AND OUTREACH

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- Selected speaker at Janelia Junior Scientist Workshop on Theoretical Biophysics (2025.10)
- Selected speaker at NITMB MathBio Convergence Conference (2025.8)
- Speaker at JuliaCon 2025 “ElasticNetworks.jl: Package for Metamaterials Research and Design” (2025.7)
- Invited speaker at 127th Statistical Mechanics Conference, Rutgers University (2024.12)
- Invited speaker at Seed Seminar of Mathematics and Physics, CNRS (2024.1)
- Speaker at American Physical Society March Meeting (2024.3, 2023.3, 2022.3)
- Interviewee in the documentary “Solving the Bonnet problem. A hands-on adventure in 17 chapters” directed by Ekaterina Eremenko (Released in 2024).
- Speaker at 123rd and 125th Statistical Mechanics Conference, Rutgers University (2023.12, 2022.12)
- Speaker Soft Matter Coffee Chat, Princeton University (2023.12, 2022.12)
- Speaker at JuliaCon 2023 “InverseStatMech.jl: Extract Interactions from Materials’ Spectra” (2023.7)
- Speaker at Princeton Graduate Certificate in Computational Science and Engineering Colloquium (2023.4)
- Workshop co-facilitator at Princeton Wintersession “Introduction to Molecular Dynamics with LAMMPS” (2023.1)
- Panelist at Women in STEM Discussion, Princeton University (2021.9)
- Speaker at Summer Undergraduate Research Fellows in Chemistry Mentoring Series, Princeton University “Statistical Mechanics: Designing ‘Surveys’ for Molecules” (2021.6)
- Speaker at Princeton Research Day “Gaston Darboux in His “Beautiful Years”: An Engaged Scientist in the Making”. <https://www.facebook.com/PUResearchDayLive/videos/137602907402968/> (2019.5)

## AWARDS AND RECOGNITIONS

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- Center for Soft and Living Matter Fellow, University of Pennsylvania, 2025–
- Charlotte Elizabeth Procter Fellowship, Princeton University, 2023–2024
- Selected participant for Advancing Graduate Leadership Conference of American Physical Society, 2022
- Featured Graduate Student Profile of Department of Chemistry, Princeton University, 2021: <https://chemistry.princeton.edu/news/grad-student-qa-haina-wang>
- Silver Prize for Excellent Science Books, Association of Popular Science Writers in Zhejiang, China, 2020
- David V. Milligan '62 Fellowship, Princeton University, 2019
- Lijen Industrial Medal in Chemistry, Singapore, 2018
- Meritorious winner in the COMAP Interdisciplinary Modelling Contest, 2017
- Best Poster for NUS-ACS Undergraduate Symposium, 2017
- Singapore National Institute of Chemistry Book Prize, 2015
- Sugar Industry of Singapore Book Prize, 2015