

WENPING CUI

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EMPLOYMENT

Postdoctoral Associate , Department of Physics, Princeton University	June 2024
Postdoctoral Fellow , Kavli Institute for Theoretical Physics, UC Santa Barbara	June 2021 - May 2024

EDUCATION

PhD in Biophysics , Boston College, United States	Aug 2014 - April 2021
PhD Thesis: Statistical Mechanics of Microbiomes	Advisor: Pankaj Mehta
MS in Statistical Physics , Universität Bonn, Germany	Aug 2011 - Feb 2014
Master Thesis: A variational study of two and three dimensional melting	Advisor: Thomas Nattermann
BS in Astrophysics , University of Science and Technology of China	Aug 2007 - Jul 2011
Bachelor Thesis: Transient Accelerating Scalar Models with Exponential Potential	Advisor: Yang Zhang

AWARDS

KITP Postdoctoral Fellow, UC Santa Barbara	2021-2024
Best poster award, The Future of Quantitative Biology Symposium, Harvard University	2019
Bonn and Cologne Graduate Scholarship, Universität Bonn	2011- 2013
Bonn International Graduate Scholarship, Universität Bonn	2011
National Astronomical Observatories Scholarship, Chinese Academy of Science	2010

ACADEMIC SERVICE

Reviewer for Proceedings of the National Academy of Sciences, Nature Communications, PLOS Computational Biology, Physical Review E.

PUBLICATIONS

W Cui, R Marsland III, P Mehta, *Les Houches Lectures on Community Ecology: From Niche Theory to Statistical Mechanics*, [arXiv:2403.05497](#)

W Cui, J Fendley, S Srikant, B Shraiman, *A model of pan-immunity maintenance by horizontal gene transfer in the ecological dynamics of bacteria and phages*, [PNAS 122 \(31\) e2417628122 \(2025\)](#)

W Cui, J. W Rocks, P Mehta, *An elementary mean-field approach to the spectral densities of random matrix ensembles*, [Physica A: Statistical Mechanics and its Applications: 129608 \(2024\)](#)

W Cui, R Marsland III, P Mehta, *Diverse communities behave like typical random ecosystems*, [Phys. Rev. E 104, 034416 \(2021\)](#)

R Marsland III, **W Cui**, P Mehta, *The Minimum Environmental Perturbation Principle: A New Perspective on Niche Theory*, [The American Naturalist 196.3 \(2020\): 291-305.](#)

W Cui, R Marsland III, P Mehta, *Effects of resource dynamics on species packing in diverse ecosystems*, [Phys. Rev. Lett. 125.4 \(2020\): 048101.](#) Editor's Suggestion, See also the synopsis in Physics Magazine: [Resource Dynamics Dictate Diversity.](#)

O Howell, **W Cui**, R Marsland III, P Mehta, *Machine Learning as Ecology*, *J. Phys. A: Math. Theor.* **53** (2020): 334001.

R Marsland III, **W Cui**, P Mehta, J Goldford, *The Community Simulator: A Python package for microbial ecology*, *Plos one* **15**, no. 3 (2020): e0230430.

R Marsland III, **W Cui**, P Mehta, *A minimal model for microbial biodiversity can reproduce experimentally observed ecological patterns*, *Sci Rep* **10**, 3308 (2020)

R Marsland III, **W Cui**, J Horowitz, *The Thermodynamic Uncertainty Relation in Biochemical Oscillations*, *Journal of the Royal Society Interface* **16**.154 (2019). [Highlight](#) by Nature Physics.

P Mehta, **W Cui**, CH Wang, R Marsland III, *Constrained optimization as ecological dynamics with applications to random quadratic programming in high dimensions*, *Phys. Rev. E* **99**.5 (2019): 052111.

R Marsland III, **W Cui**, J Goldford, A Sanchez, K Korolev, P Mehta, *Available energy fluxes drive a phase transition in the diversity, stability, and functional structure of microbial communities*, *PLoS Comput Biol* **15**.2 (2019): e1006793.

W Cui, P Mehta, *Identifying feasible operating regimes for early T-cell recognition: The speed, energy, accuracy trade-off in kinetic proofreading and adaptive sorting*, *PloS one* **13**.8 (2018): e0202331.

M Li, **W Cui**, MS Dresselhaus, G Chen, *Electron energy can oscillate near a crystal dislocation*, *New Journal of Physics*. **19**,1 (2017)

Li, Mingda, et al. , *Proximity-Driven Enhanced Magnetic Order at Ferromagnetic-Insulator–Magnetic-Topological-Insulator Interface*, *Phys. Rev. Lett.* **115**, 087201 (2015)

M Li, **W Cui**, J Yu, Z Dai, Z Wang, F Katmis, W Guo, J Moodera, *Magnetic Proximity Effect and Interlayer Exchange Coupling of Ferromagnetic/Topological Insulator/Ferromagnetic Trilayer*, *Phys. Rev. B.* **91**, 014427 (2015)

W Cui, M Li, Z Dai, Q Meng, Y Zhu, *Near-Field Optical Effect of a Core-Shell Nanostructure In Proximity to a Flat Surface*, *J. Chem. Phys.* **140**, 044109 (2014)

M Li, Z Dai, **W Cui**, Z Wang, F Katmis, P Le, J Wang, L Wu, Y Zhu, *Tunable THz Surface Plasmon Polariton based on Topological Insulator-Layered Superconductor Hybrid Structure*, *Phys. Rev. B.* **89**, 235432 (2014)

M Li, **W Cui**, L Wu, Q Meng, Y Zhu, Y Zhang, W Liu, Z Ren, *Topological Effect to Surface Plasmon Excitation in Topological Insulator Nanowires*, *Canadian Journal of Physics*. **10**, 1139 (2014)

W Cui, Y Zhang, Z Fu, *Transient Accelerating Scalar Models with Exponential Potential*, *Res. Astron. Astrophys.* **13**, 629 (2013)

CONFERENCE / WORKSHOP PRESENTATIONS

Effects of horizontal gene transfer on phage-host coevolution

Flash Talk at Workshop hosted by Princeton Center for Theoretical Science, New Jersey	Feb, 2025
Talk at APS March Meeting, Minneapolis, Minnesota	March, 2024
Talk at Center for Quantitative Biology, Peking University, Beijing, China	Mar, 2023

Effects of resource dynamics on species packing in diverse ecosystems

Poster at MIT Quantitative Ecology Meeting, Boston, United States	Jan, 2020
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Diverse communities behave like typical random ecosystems

Talk at Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China	Mar, 2023
Poster at Boulder School for Condensed Matter and Materials Physics	Jul, 2019
Talk at APS March Meeting 2019, Boston, United States	Mar, 2019
Poster at Stochastic Physics in Biology, Gordon Research Conference, Ventura CA, United States	Jan, 2019
Poster at Bridging Theory and Experiment in Microbial Communities, PCTS, Princeton University	Dec, 2018

Why it is difficult to engineer diverse, synthetic microbial communities?

Talk and Poster at The Future of Quantitative Biology Symposium, Harvard University

May, 2019

Talk at Biological Design Center Symposium, Boston University

May, 2019

Invasion dynamics in generalized MacArthur's consumer resource models

Talk at APS March Meeting 2018, Los Angeles, United States

Mar, 2018