WENPING CUI

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EDUCATION

PhD Candidate in Biophysics, Boston College, United States — Aug 2014 - April 2021
PhD Thesis: Statistical Mechanics of Microbiomes — Advisor: Pankaj Mehta

Master of Science in Statistical Physics, Universität Bonn, Germany — Aug 2011 - Feb 2014
Master Thesis: A variational study of two and three dimensional melting — Advisor: Thomas Nattermann

Bachelor Degree 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

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

SKILLS

Computational skills: Strong proficiency in Python, Pytorch, TensorFlow, Matlab, Linux, C/C++, Git

Machine Learning: Deep Learning, Deep Reinforcement Learning, Belief Propagation, Convex Optimization.

Theory: Biophysics, Theoretical Ecology, Statistical Physics, Random Matrices, Spin Glass Theory, Information Theory.

PUBLICATIONS

W Cui, J. W Rocks, P Mehta, *The Perturbative Resolvent Method: spectral densities of random matrix ensembles via perturbation theory*, arXiv:2012.00663 (in submission)

W Cui, R Marsland III, P Mehta, *Diverse communities behave like typical random ecosystems*, arXiv:1904.02610 (in submission)

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

The effect of resource dynamics on species packing in diverse ecosystems
Poster at MIT Quantitative Ecology Meeting, Boston, United States — Jan, 2020

Diverse communities behave like typical random ecosystems
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

Identifying optimal operating regimes for early T-cell recognition
Talk at APS March Meeting 2017, New Orleans, United States — Mar, 2017
Poster at Boston Physics of Living Systems Hangout, Boston University — Oct, 2016