Ching-Hao Wang, Ph.D.

Email: chw0908 [AT] protonmail.com Homepage: https://chinghao0703.github.io/about/ Citizenship: USA

Professional Summary

Driven theoretician with a focus on computations, data-driven simulation and mathematical modeling. Advanced analytical and quantitative skills with strong communication and collaboration abilities. Looking to tackle important real-life problems while continuing to learn. Particularly interested in building statistical and machine learning models to derive insights from data.

Current Position

Director of Artificial Intelligence/Machine Learning (AI/ML) Engineering at GlaxoSmithKline (GSK).

Skills and Experience

- Programming languages: Python, R, C, C++, Matlab, Mathematica, SQL
- Specialized knowledge: Probabilistic graphical model, Bayesian statistics, machine learning, Monte Carlo sampling and MCMC, applied probability, information theory, dynamical systems modeling, optimization theory, statistical physics, machine learning on large biological and geospatial datasets
- Miscellaneous: Scikit, Pytorch, Keras, Pandas, matplotlib, ggplot2, tidyverse, Git, Unix/Linus shell script, Snowflake, AWS cloud computing

Employment

GlaxoSmithKline (GSK), Cambridge, MA

Mar. 2024 ~ Present: Director of AI/ML Engineering Mar. 2022 ~ Mar. 2024: Senior AI/ML Engineer Jun. 2020 ~ Mar. 2022: AI/ML Engineer

Indigo Ag., Boston, MA

Jul. 2019 \sim May 2020 Job title: Data Scientist, Machine Learning

- Build machine learning models to analyze geospatial data to evaluate intervention efficacy in field trials
- Perform power analysis to inform trial design
- Propose and implement algorithms to process raw machine data to facilitate data science tasks
- Collaborate with software engineers to productionize analysis codes
- Contribute to and lead discussions in Indigo's weekly machine learning seminar

Northeastern University, Boston, MA

Feb. 2019 ~ Jul. 2019 Job title: *Postdoctoral Research Associate* Advisor: Herbert Levine

- Mathematical modeling of cancer stem cell differentiation and phenotypic switching
- Build a Bayesian inference procedure to analyze experimental data to estimate stem cell proliferation rate

Education

Boston University, Boston, MA
Ph.D. in Physics, Sep. 2013 ~ Jan. 2019
Advisor: Pankaj Mehta
Dissertation: Statistical physics of information processing by cells
Research Interests: Theoretical Biophysics, Statistical Mechanics, Statistical and Machine Learning

National Tsing-Hua University, Hsinchu, Taiwan

M.S. in Physics, Sep. 2011 Dissertation: Quantum fluctuations of non-linear solitary excitations in Bose-Einstein condensate

National Tsing-Hua University, Hsinchu, Taiwan B.S. in Electrical Engineering, Sep. 2009

Published and submitted papers

- Simple Causal Relationships in Gene Expression Discovered through Deep Learned Collective Variables, Ching-Hao Wang, Kalin Vetsigian, Chris Lin, Finnian Firth, Glyn Bradley, Lena Granovsky, Jeremy L England, bioRxiv:10.1101/2023.01.18.524617.
- A high-bias, low-variance introduction to Machine Learning for physicists,
 P. Mehta, M. Bukov, C.-H. Wang, A.G.R. Day, C. Richardson, C. K. Fisher, and D. J. Schwab, *Physics Reports* 810, 1-124 (2019)
- Pinned, locked, pushed, and pulled traveling waves in structured environments, <u>Ching-Hao Wang</u>, Sakib Matin, Ashish B. George, and Kirill S. Korolev, *Theor. Popul. Biol.* 127, <u>102-119(2019)</u>.
- Constrained optimization as ecological dynamics with applications to random quadratic programming in high dimensions, Pankaj Mehta, Wenping Cui, Ching-Hao Wang, and Robert Marsland, *Phys. Rev. E* 99, 052111 (2019).
- The strength of protein-protein interactions controls the information capacity and dynamical response of signaling networks, Ching-Hao Wang, Caleb J. Bashor, and Pankaj Mehta, (arXiv:1811.05371 and bioRxiv:10.1101/469197).
- 6. Thermodynamic Paradigm for Solution Demixing Inspired by Nuclear Transport in Living Cells, Ching-Hao Wang, Pankaj Mehta, and Michael Elbaum, *Phys. Rev. Lett.* 118, 158101 (2017).
- Ginzburg-Landau theory of the bcc-liquid interface kinetic coefficient, Kuo-An Wu, Ching-Hao Wang, Jeffrey J. Hoyt, and Alain Karma, *Phys. Rev. B* 91, 014107 (2015).
- Particle-wave duality in quantum tunneling of a bright soliton, <u>Ching-Hao Wang</u>, Tzay-Ming Hong, Ray-Kuang Lee, and Daw-Wei Wang, *Opt. Express* 20, 22675-<u>22682</u> (2012).

Professional Service

Referee for journals: Physical Review Letters, eLife, Plos One Guest editor: eLife

Invited talks

- (04/2018) Kavli Talk: School of Engineering and Applied Sciences, Harvard University: Cambridge, MA
- (03/2018) Center for Genomics and Systems Biology, New York University: New York, NY
- (01/2018) James Franck Institute, The University of Chicago: Chicago, IL
- (01/2018) MIT Non-equilibrium Statistical Mechanics (NESM) journal club: Cambridge, MA

Contributed talks

(03/2019) APS March Meeting: Boston, MA

- (05/2018) Annual symposium of Boston University Biological Design Center: Boston, MA
- (03/2018) APS March Meeting: Los Angeles, CA
- (01/2017) APS March Meeting: New Orleans, LA
- (07/2016) iPoLS Annual meeting at Harvard University: Cambridge, MA
- (03/2016) APS March Meeting: Baltimore, MD

Poster presentations

(09/2017) MIT Biophysics Retreat: North Falmouth, MA

(06/2017) Boston University Biological Design Center Kickoff Symposium: Boston, MA

- (04/2017) Simons foundation MMLS conference on theory & biology: New York, NY
- (07/2016) q-Bio conference: Nashville, TN

(04/2016) Boston Physics of Living Systems Hangout at MIT: Cambridge, MA

(01/2016) Physics Informed Machine Learning: Santa Fe, NM

(04/2010) Conference on Nonlinear Phenomena in Degenerate Quantum Gases: Ourense, Spain

Teaching Experience

Teaching Assistant: Statistical and Thermal Physics	Spring 2017 & Spring 2016
Boston University	

Teaching Assistant: Elementary Physics Boston University

Conferences and Workshops Attended

APS March Meeting, Boston, MA	March 2019
APS March Meeting, Los Angeles, CA	March 2018
Cargése Summer School on Theoretical Biophysics, Corsica, France	July 2017
Simons Foundation MMLS Conference on Theory & Biology, New York, NY	April 2017
APS March Meeting, New Orleans, LA	March 2017
Quantum Machine Learning, Perimeter Institute, Waterloo, ON	August 2016
Q-bio conference, Nashville, TN	July 2016
iPoLS Annual Meeting at Harvard University, Cambridge, MA	July 2016
APS March Meeting, Baltimore, MD	March 2016
Physics Informed Machine Learning, Santa Fe, NM	January 2016
Conference on Nonlinear Phenomena in Degenerate Quantum Gases, Ourense, Spain	April 2010

Fall 2013 & Spring 2014