Julian Gold

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Education

Ph.D. in Mathematics 2012 – 2017
University of California, Los Angeles
Advisor: Marek Biskup

B.S. with highest honors in Mathematics 2007 – 2012
University of California, Davis

Employment

Schmidt DataX Data Scientist 2023 – present
Princeton University
Center for Statistics and Machine Learning

NSF MSPRF Postdoctoral Fellow / Boas Assistant Professor 2018 – 2021
Sponsoring scientist: Antonio Auffinger
Northwestern University
Department of Mathematics

RTG Postdoctoral Fellow 2017 – 2018
Northwestern University
Department of Mathematics

Research interests

Integrating probability theory and machine learning to model complex systems in both biology and cognition. Optimal transport methods for analyzing spatial transcriptomics and other high-dimensional, multi-modal data. Statistical and computational approaches for understanding representation, learning, and decision-making in natural and artificial systems.

Publications and preprints

1. **Full-Rank Optimal Transport in Linear Space via Hierarchical Refinement**
   P. Halmos*, J. Gold*, and B.J. Raphael
   (Submitted to ICML)

2. **Anomaly Detection in Spatial Transcriptomics via Spatially Localized Density Comparison**
   G. Hu*, J. Gold, U. Chitra, S. Joshi, B.J. Raphael
   (Submitted to ISMB)

3. **Learning Latent Trajectories in Developmental Time Series with Hidden-Markov Optimal Transport**
   P. Halmos*, J. Gold*, X. Liu, and B.J. Raphael
   Accepted to RECOMB 2025

4. **Low-Rank Optimal Transport through Factor Relaxation with Latent Coupling**
   P. Halmos*, X. Liu*, J. Gold*, and B.J. Raphael
   The Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS), 2024
   OpenReview

5. **A count-based model for delineating cell-cell interactions in spatial transcriptomics data**
   H. Sarkar*, U. Chitra*, J. Gold, and B.J. Raphael
   Bioinformatics, Volume 40, Issue Supplement 1, Pages i481–i489, 2024
   Journal

6. `DeST-OT`**: Alignment of Spatiotemporal Transcriptomics Data**
   P. Halmos*, X. Liu*, J. Gold, F. Chen, L. Ding, and B.J. Raphael
   International Conference on Research in Computational Molecular Biology, Pages 434–437, 2024
   Cell Systems, 2025, ISSN: 2405-4712

7. **On the number and size of holes in the growing ball of first-passage percolation**
   M. Damron, J. Gold, W.-K. Lam, and X. Shen
   Transactions of the American Mathematical Society, Volume 377, Number 03, Pages 1641–1670, 2024

8. **The number of saddles of the spherical p-spin model**
   A. Auffinger and J. Gold
   (Preprint, arXiv:2007.09269)

9. **Dynamical freezing in a spin glass system with logarithmic correlations**
   A. Cortines, J. Gold, and O. Louidor
   Electronic Journal of Probability, Volume 23, Number 59, Pages 1–31, 2018

10. **Intrinsic isoperimetry of the giant component of supercritical bond percolation in dimension two**
    J. Gold
    Electronic Journal of Probability, Volume 23, Number 53, Pages 1–41, 2018

11. **Isoperimetry in supercritical bond percolation in dimensions three and higher**
    J. Gold
    Annales de l'institut Henri Poincaré (B) Probability and Statistics, Volume 54, Number 4, Pages 2092–2158, 2018

12. **A bound for orderings of Reidemeister moves.**
J. Gold
Algebraic & Geometric Topology, Volume 13, Number 6, Pages 3099–3110, 2013

Awards, fellowships and grants

NSF Postdoctoral Research Fellowship DMS-1803622	2018 – 2021
Departmental Teaching Award (UCLA)	2017
UCLA Dissertation Year Fellowship	2016 – 2017
NSF RTG Fellowship	2012 – 2013

Synergistic activities

Co-organizer of the Northwestern probability seminar	Fall 2017 – Spring 2021
Member of rotating committee for the 41st Midwest Probability Colloquium	2019

Teaching

Instructor, Princeton University Wintersession	Winter 2024, 2025
Introduction to Machine Learning	
Introduction to Optimal Transport	
Instructor, NPEP	Winter Quarter, 2020
Introduction to Mathematics	
Instructor, Northwestern University	2017 – 2020
Probability (graduate, undergraduate), Calculus	
Teaching assistant, UCLA	2013 – 2016
Analysis (graduate), Stochastic Processes, Linear Algebra, Calculus	