Lauren McGough

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Education

Princeton University, PhD in Physics **June 2018**
- Advisors: William Bialek (biophysics theory), Herman Verlinde (high energy theory)
- Title: Characterizing Information in Physical Systems, from Biology to Black Holes

Massachusetts Institute of Technology **June 2012**
- S.B. in Mathematics and Physics, Minor in Music

Research

University of Chicago, Postdoctoral Researcher
- Modeling dynamics of immune memory and pathogen evolution **2020-present**
  Advisor: Sarah Cobey
- Benchmarking molecular simulations of proteins with time-resolved crystallography data **2018-2020**
  Advisor: Rama Ranganathan

Princeton University, Graduate Researcher
- Information and precision in embryo development **2017-2018**
  Advisor: William Bialek
- Black holes, conformal field theory and quantum information **2013-2016**
  Advisor: Herman Verlinde

Publications

L. McGough and S. Cobey, "A Speed Limit on Serial Strain Replacement from Original Antigenic Sin." Proceedings of the National Academy of Sciences of the United States of America 121 (25): e2400202121. (2024) doi:10.1073/pnas.2400202121

L. McGough, H. Casademunt, M. Nikolić, Z. Aridor, M. D. Petkova, T. Gregor, and W. Bialek, "Finding the Last Bits of Positional Information." PRX Life 2 (1): 013016. (2024) doi:10.1103/PRXLife.2.013016

E. Klyshko*, J. S. H. Kim*, **L. McGough**, V. Valeeva, E. Lee, R. Ranganathan, S. Rauscher, "Functional Protein Dynamics in a Crystal," Nature Communications 15 (1): 3244 (2024) doi:10.1038/s41467-024-47473-4

L. McGough, "Getting the Most out of Noisy Surveillance Data." Nature Computational Science 2 (9): 559–60. (2022)

R. J. Oidtman, P. Arevalo, Q. Bi, **L. McGough**, C. J. Russo, D. Vera Cruz, M. C. Vieira, K. M. Gostic,"Influenza immune escape under heterogeneous host immune histories," Trends in Microbiology, 2021, doi:10.1016/j.tim.2021.05.009

K. Gostic, **L. McGough**, E. Baskerville, S. Abbott, K. Joshi, et al. "Practical considerations for measuring the effective reproductive number, R_t," PLOS Computational Biology 16(12): e1008409. (2020) doi:10.1371/journal.pcbi.1008409 [medRxiv:2020.06.18.20134858]

L. McGough, M. Mezei and H. Verlinde, "Moving the CFT into the bulk with $T\bar{T}$," JHEP **2018**, 10 (2018). doi:10.1007/JHEP04(2018)010 [arXiv:1611.03470 [hep-th]].

S. Jackson, **L. McGough**, and H. Verlinde. "Conformal bootstrap, universality and gravitational scattering," Nucl. Phys. B **901**, 382 (2015). [arXiv:1412.5205 [hep-th]]

J. Lee, **L. McGough**, and B. R. Safdi. "Rényi entropy and geometry," Phys. Rev. D **89**, no. 12, 125016 (2014), [arXiv:1403.1580 [hep-th]].

L. McGough and H. Verlinde. "Bekenstein-Hawking entropy and topological entanglement entropy," JHEP **1311**, 208 (2013), [arXiv:1308.2342 [hep-th]].

Awards

NIH Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (Parent F32) **2019-2022**
National Science Foundation Graduate Research Fellowship **2012-2017**
National Defense Science and Engineering Graduate Fellowship (declined) **2012**
Robert C. Byrd Honors Scholarship **2008-2012**

Presentations

Constraints on pathogen evolution from order-dependent immunity.
APS March Meeting, Minneapolis, MN. **March 2024**

Original antigenic sin and the dynamics of pathogen evolution.
Physical Concepts and Computational Models in Immunology.
Cargèse, Corsica, France **September 2022**

Evaluating simulations of protein dynamics using novel, high-resolution data.
Gordon Research Conference on Molecular Mechanisms in Evolution.
Poster presentation, Stonehill, MA. **June 2019**

Protein dynamics from experiment and simulation.
APS March Meeting, Boston, MA. **March 2019**

Efficient transmission of unique cell identities via correlated fluctuations, emergent discreteness, and error-correcting codes.
APS March Meeting, Los Angeles, CA. **March 2018**

Encoding a complex body plan in a single cell: information transmission in the fruit fly embryo.
Kavli Koffee Hour, Harvard University, Cambridge, MA. **Feb. 2018**

Maximal minimal k-rankings of caterpillar graphs. **Jan. 2011**
Joint MAA/AMS Mathematics Meetings, New Orleans.

The homotopy classes of linear 3-fields on the 3-sphere. **Aug. 2009**
Young Mathematicians Conference, Ohio State University, Columbus, OH.

Teaching and Service

Assistant Instructor, Princeton University
PHY412: Biophysics **Fall 2017**
PHY104: General Physics II, Electricity and Magnetism **Spring 2017**
PHY207: Mechanics and Waves **Fall 2016**

Leadership
Princeton Physics Department Graduate Admissions Committee **Feb. 2015**
Princeton Physics Graduate Student Committee **Sept. 2012 - May 2018**
Princeton High Energy Theory Journal Club **Sept. 2013 - May 2015**

Outreach
Treasurer, Girls' Angle, a math club for girls, *Cambridge, MA* **2007-Present**
Teacher, MIT ESP, *Cambridge, MA* **Sept. 2008-Nov. 2011**
Leader and teacher, SEALNet Project Thailand, *Lampang, Thailand* **Aug. 2010**

Other Skills

Software and programming: Mathematica, Matlab, Python, R, LaTeXLanguages: English (primary), French (proficient)