

Bertrand Ottino-Löffler

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Education

Cornell University, Ithaca, NY

2014-2018

- PhD in Applied Math under Steven Strogatz, thesis titled “*Synchronization unlocked: spirals, zetas, rings, and glasses.*”

California Institute of Technology, Pasadena, CA

2010-2014

- BS in Mathematics and Physics.

Research Experience

Rockefeller University, Center for Studies in Physics and Biology

2021-Present

- Was hired as an independent fellow and worked in dynamical systems, biophysics and immunology, and developed a course in dynamics aimed towards biology PhD students.

Massachusetts Institute of Technology, Department of Physics

2018-2021

Advisor: Mehran Kardar, Statistical Physics

- Worked as a postdoc in statistical mechanics, focusing on growing rough interfaces and spreading population models using a combination of asymptotic and numerical methods.

Cornell University, Center for Applied Math

2014-2018

Advisor: Steven Strogatz, Applied Math

- Worked in dynamical systems, with an early focus on networks of coupled oscillators close to synchronization. This includes both numerical and theoretical analysis of scaling laws, topological effects, and spatial phenomena close to bifurcation (e.g., frequency spirals). Recent work has looked at evolutionary graph theory, using probability theory to analyze the incubation periods of various diseases.

California Institute of Technology, Department of Physics

2013

Advisor: Michael Cross, Theoretical Physics

- Investigated thermal noise propagation in systems of amplitude-phase coupled oscillators from both theoretical and modeling perspectives to explain experimental observations.

Northwestern University Department of Engineering Sciences and Applied Mathematics

2012

Advisor: Assistant Professor Daniel Abrams, Applied Mathematics, summer intern

- Created model to simulate traffic conditions on a two-way street to compare with predictions made from theoretical calculations under both simple and semichaotic conditions. The work resulted in two publications.

Northwestern University Knight Innovation Laboratory

2011

Advisor: Professor Larry Birnbaum, Computer Science, summer intern

- Worked on various computational linguistics tools, including simple engines to find relevant images for blogs, automatic comic generators, and developed thematic tagging for news stories.

Northwestern Center for Connected Learning (High School Internship)

2009

Advisor: Professor Uri Wilensky, Computer Science and School of Education and Social Policy, summer intern

- Created, designed and programmed a novel model that generalized “Hotelling’s Law” to demonstrate the principle of competitive economic geography. Simulations done in Netlogo, and the model is now in the standard release of Netlogo. The work resulted in a publication.

Publications

- J. Pae, N. Schwan, B. Ottino-Löffler, W. DeWitt, A. Garg, J. Bortolatto, A. Vora, J. Shen, A. Hobbs, T. Castro, L. Mesin, F. Matsen IV, M. Meyer-Hermann & G. Victora, *Transient silencing of hypermutation preserves B cell affinity during clonal bursting*, Nature (2025) <https://www.nature.com/articles/s41586-025-08687-8>.
- B. Ottino-Löffler, G. Victora, *On Possible Indicators of Negative Selection in Germinal Centers*, Bulletin of Mathematical Biology (Under review 2024) <https://arxiv.org/abs/2312.05785>.
- D. Swartz, B. Ottino-Löffler, M. Kardar, *A Seascape Origin of Richards Growth*, Phys. Rev. E 105, 014417 (2022). <https://journals.aps.org/pre/abstract/10.1103/PhysRevE.105.014417>.
- B. Ottino-Löffler, M. Kardar, *Population Extinction on a Random Fitness Seascape*, Phys. Rev. E 102, 052106 (2020). <https://journals.aps.org/pre/abstract/10.1103/PhysRevE.102.052106>.
- B. Ottino-Löffler, S. Strogatz, *Volcano transition in a solvable model of oscillator glass*, Phys Rev. Lett. 120, 264102 (2018). <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.264102>.
- B. Ottino-Löffler, J. Scott, S. Strogatz, *Evolutionary dynamics of incubation periods*, eLife 6, e30212 (2017). <https://elifesciences.org/articles/30212>.
- B. Ottino-Löffler, J. Scott, S. Strogatz, *Takeover times for a simple model of network infection*, Phys. Rev. E 96, 012313 (2017). <https://journals.aps.org/pre/abstract/10.1103/PhysRevE.96.012313>.
- B. Ottino-Löffler, S. Strogatz, *Comparing the locking threshold for rings and chains of oscillators*, Phys. Rev. E 94, 062203 (2016). <http://link.aps.org/doi/10.1103/PhysRevE.94.062203>.
- B. Ottino-Löffler, S. Strogatz, *Frequency spirals*, Chaos 26, 094804 (2016). <http://aip.scitation.org/doi/10.1063/1.4954038>. [Featured on Editor's Pick list, and on the journal's "most read" list of 2016]
- B. Ottino-Löffler, S. Strogatz, *Kuramoto model with uniformly spaced frequencies: Finite-N asymptotics of the locking threshold*, Phys. Rev. E 93, 062220 (2016). <http://aip.scitation.org/doi/10.1063/1.4954038>.
- M. Panaggio, B. Ottino-Löffler, P. Hu, D. Abrams, *Symmetry breaking in optimal timing of traffic signals on an idealized two-way street*. Phys. Rev. E 88, 032801 (2013). <http://link.aps.org/doi/10.1103/PhysRevE.88.032801>.

Teaching and Outreach Experience

Instructor for Dynamical Systems, Rockefeller University

2022

- Designed, taught, graded, and held office hours for "A Survey in Dynamical Systems for Busy People," aimed at PhD students. (Approximately eleven students).

Graduate Student Mentorship, MIT

2021-2022

- Provided mentorship and research guidance for Daniel Swartz, a first-year graduate student.

Graduate Student Mentorship, Cornell

2018

- Provided mentorship and research guidance for David Hathcock, a first-year graduate student.

Volunteer for Boynton Middle-School Math Day

2016

- Hosted activities and games designed to expose students in grades six to eight to mathematical concepts. Part of a collaboration between Cornell and local schools.

Instructor for Math Explorer's Club, Cornell

2016

- Designed and ran lessons to teach students in grades eight through twelve about mathematical induction over the course of two weekends. Part of a NSF-sponsored collaboration between Cornell and local schools. (Approximately thirty students).

Teaching Assistant for Math 0, Caltech

2013

- Graded assignments, answered questions, and held office hours for the class of 2018 (Approximately 200 students).

Talks and Presentations

- B. Ottino-Löffler, G. Victora, *Evaluating the Logic of Selection in Germinal Centers*. Work presented at SIAM DS23 (2023).
- B. Ottino-Löffler, G. Victora, *Evaluating the Logic of Selection in Germinal Centers*. Work presented at the APS March Meeting (2023).
- D. Swatz, B. Ottino-Löffler, M. Kardar, *A Seascapes Origin of Richards Growth*. Work presented at the APS March Meeting (2022).
- B. Ottino-Löffler, M. Kardar, *Population extinction on a random fitness seascape*. Work presented at the APS March Meeting (2021).
- B. Ottino-Löffler, M. Kardar, *Population extinction on a random fitness seascape*. Work presented at the 85th New England Complex Fluids Workshop (2020).
- B. Ottino-Löffler, M. Kardar, *Extinction transitions in a seascape population model*. Work presented at the 83rd New England Complex Fluids Workshop (2020).
- B. Ottino-Löffler, S. Strogatz, *The Evolutionary Dynamics of Incubation Periods*. Paper scheduled for presentation at the APS March meeting, but cancelled due to pandemic (2020).
- B. Ottino-Löffler, M. Kardar, *Extinction transitions in a seascape population model*. Work presented at the 122nd Statistical Mechanics Conference at Rutgers University (2019).
- B. Ottino-Löffler, S. Strogatz, *The Evolutionary Dynamics of Incubation Periods*. Paper presented at the 9th Annual Biophysics Retreat (2019).
- B. Ottino-Löffler, M. Kardar, *A Richards-like stochastic population growth model*. Work presented at the 80th New England Complex Fluids Workshop (2019).
- B. Ottino-Löffler, S. Strogatz, *A volcano transition in a solvable model of oscillator glass*. Paper presented at SIAM Conference of Applications of Dynamical Systems (2019).
- B. Ottino-Löffler, M. Kardar, *The surface growth of bacterial ranges*. Work presented at the JSMF-SFI Postdocs in Complexity Conference VI (2019).
- B. Ottino-Löffler, S. Strogatz, *A volcano transition in a solvable model of oscillator glass*. Paper presented at the Emory Theoretical Biophysics Workshop (2019).
- B. Ottino-Löffler, J. Scott, S. Strogatz, *The evolutionary dynamics of incubation periods*. Paper presented at a at the JSMF-SFI Postdocs in Complexity Conference III (2018).
- B. Ottino-Löffler, J. Scott, S. Strogatz, *The evolutionary dynamics of incubation periods*. Paper presented as a Physics of Living Systems short talk at MIT (2018).
- B. Ottino-Löffler, S. Strogatz, *A volcano transition in a solvable model of oscillator glass*. Thesis presented at Cornell University (2018).
- B. Ottino-Löffler, J. Scott, S. Strogatz, *The evolutionary dynamics of incubation periods*. Paper presented to Cornell Probability Seminar (2018).
- B. Ottino-Löffler, J. Scott, S. Strogatz, *The evolutionary dynamics of incubation periods*. Paper presented to group at Brown University (2018).
- B. Ottino-Löffler, J. Scott, S. Strogatz, *The evolutionary dynamics of incubation periods*. Paper presented to group at University of Michigan Ann Arbor (2017).
- B. Ottino-Löffler, S. Strogatz, *Frequency spirals*. Paper presented to group at Cleveland Clinic (2017).
- B. Ottino-Löffler, S. Strogatz, *Frequency spirals*. Paper presented at SIAM Conference on Applications of Dynamical Systems (2017).
- B. Ottino-Löffler, D. Abrams., *Symmetry breaking in optimal timing of traffic signals on an idealized two-way street*. Paper presented at Mellon Mays Undergraduate Fellowship 2013 Western Regional Conference.

Awards and Distinctions

- **Fellow of The Center for Studies in Physics and Biology at The Rockefeller University (2021-present)**
- **James S. McDonnell Foundation Understanding Dynamic and Multi-scale Systems Postdoctoral Fellowship (2018-2021):** Based on academics and a research proposal.
- **National Science Foundation Graduate Research Fellowship (2016-2018):** Based on academics and a research proposal.
- **Cornell Sloan and Colman Fellowships (2014-2016):** Based on diversity statement in graduate application.
- **Mellon May Undergraduate Fellowship (2012-2014):** Based on academic performance and participation in diversity events.
- **Summer Undergraduate Research Fellowship (2012):** Based on academic performance and a research proposal.

Other Service

- Interviewed and helped decide on candidates for the Physics Fellow position at Rockefeller University from 2022-2024.
- Acted as a journal referee for Chaos, Proceedings of the Royal Society A, PLOS Computational Biology, Physics Letters A, and Physical Review Letters.
- Chaired a session at the Emory Theoretical Biophysics Workshop (January 2019).
- Co-chaired a contributed presentations session at SIAM DS23 (May 2023)