Max Lipton

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Research interests: Geometric analysis, physical knot theory, dynamical systems

Employment

2023 – present **Massachusetts Institute of Technology**
NSF Postdoctoral Fellow, Instructor of Mathematics

Education

2016 – 2023 **Cornell University**
Ph.D., Mathematics
Advisor: Steven Strogatz.

2016 – 2020 **Cornell University**
M.S., Computer Science

2012 – 2016 **Willamette University**
B.A., Mathematics and Computer Science
Magna cum laude.

2015 **Independent University of Moscow**
Certificate of Completion
Math in Moscow study abroad program.

Papers and Preprints

Lipton, **M.** (2023). Topological approaches to knotted electric charge distributions. *Partial Differ. Equ. Appl.*, *4*. https://arxiv.org/abs/2009.03958.

Lipton, **M.** (2022). Complex asymptotics of the Möbius energy gradient of symmetric helix pairs. *Preprint*. https://arxiv.org/abs/2209.09403.

Lipton, **M.**, & Nair, G. (2022). Stationary curves under the Möbius-Plateau energy. *Preprint*. https://arxiv.org/abs/2208.12678.

Lipton, **M.**, Strogatz, S. H., & Townsend, A. (2022). Exploring the electric field around a loop of static charge: Rectangles, stadiums, ellipses, and knots. *Phys. Rev. Research*, *4*. https://arxiv.org/abs/2204.10295.

Lipton, **M.** (2021). A lower bound on the critical points of the electric potential of a knot. *J. Knot Theor. Ramif.*, *30*. https://arxiv.org/abs/1908.01942.

Lipton, **M.**, Mirollo, R., & Strogatz, S. H. (2021). The Kuramoto model on a sphere: Explaining its low-dimensional dynamics with group theory and hyperbolic geometry. *Chaos*, *31*. https://arxiv.org/abs/1907.07150.

Lipton, **M.** (2018). Conformal group actions on generalized Kuramoto oscillators. *Preprint*. https://arxiv.org/abs/1812.06539.

Lipton, **M.**, Mackall, E., Mattman, T. W., Pierce, M., Robinson, S., Thomas, J., & Weinschelbaum, I. (2016). Six variations on a theme: Almost planar graphs. *Involve*, *11*. https://arxiv.org/abs/1608.01973.

Teaching Experience

Cornell University, Department of Mathematics

Fall 2022	**Teaching Assistant.** MATH 4200/5200: Differential Equations and Dynamical Systems
Fall 2020	**In-Person and Virtual Instructor.** MATH 1120: Calculus II
Spring 2019	**Teaching Assistant.** MATH 2240: Multivariable Calculus and Linear Algebra
Fall 2017 – Fall 2018	**Teaching Assistant.** MATH 3110: Real Analysis

Other Teaching Experience

July 2022	**In-Person Faculty.** Solving Big Problems *Bridge to Enter Advanced Mathematics (BEAM) Summer Away Camp* *Union College, Schenectady, NY*
Summer 2022	**Curriculum Designer.** MATH 1110: Calculus I, MATH 2210: Linear Algebra *Cornell University Active Learning Initiative*
Spring 2019	**Course Assistant.** CLAS 2642: The Art of Mathematics *Cornell University, Department of Classics*
Spring 2017	**Volunteer Teaching Assistant.** MATH 102: Intermediate Algebra *Cornell Prison Education Program* *Auburn State Penitentiary, Auburn, NY*
January 2013 – May 2016	**Department Tutor.** Various mathematics courses *Willamette University, Department of Mathematics* *Salem, OR*

Selected Conference and Seminar Talks

Upcoming Talks

Winter 2024	International Conference on Applications of Geometry and Topology, Merida, Mexico
2023	Geometric Analysis Seminar, MIT

Past Talks

April 2023	Geometric Analysis Seminar, University of Chicago, IL
March 2023	Topics in Differential Geometry Workshop, Brown University, Providence, RI
October 2022	Geometry Seminar, University of Rochester, NY Cornell Olivetti Club *Plateau problems with Möbius boundary energy*
May 2022	Dynamics/PDEs Seminar, Instituto de Ciencias Matemáticas (ICMAT), Madrid, Spain *Critical points and equipotential surfaces of knotted charge distributions*
December 2021	Discrete and Topological Methods for DNA Assembly Group, University of South Florida, Tampa, FL
March 2021	Cornell Symplectic Geometry Seminar *Hamiltonian mechanics and symplectic geometry (expository)*

Selected Conference and Seminar Talks (continued)

October 2020	Albaugh Mathematics Colloquium, Willamette University, Salem, OR *Current developments in electrostatic knot theory*
July 2020	Cornell Applied Dynamics Seminar
May 2019	SIAM Dynamical Systems Conference, Snowbird, UT *Conformal groups acting on generalized Kuramoto oscillators*
July 2018	Young Topologists Meeting, University of Copenhagen, Denmark *Right-angled Artin groups (expository)*
May 2018	International Conference for Friends of AdIMOM, University of Toronto, Canada *Right-angled Artin groups (expository)*

Professional Service

Cornell University

2019 – 2022	Undergraduate mentor, *Mathematics Directed Reading Program* *Students Mentored: Anthony Nguyen, Sidhanth Holakere, Michael Armendariz* *Topics: Classical mechanics, dynamical systems, Riemannian geometry*
	Extended time exam proctor, *Student Disability Services*
2018 – 2019	Department of Mathematics Representative, *Cornell Graduate Student Assembly, Budgetary Committee*
2017, 2019	Incoming graduate student mentor, *Department of Mathematics*
2018	"What Is...?" Seminar organizer, *Department of Mathematics*
2017	Conference organizational assistant, *Cornell Topology Festival*
	Prospective student weekend organizer, *Department of Mathematics*
2016–2017	First year class representative, *Department of Mathematics*

Other Service

2021	Journal referee, *Communications on Pure and Applied Analysis*
2019	Complex Dynamics Session Chair, *SIAM Dynamical Systems Conference, Snowbird, UT*

Awards and Honors

2023	**NSF Mathematical Sciences Postdoctoral Research Fellowship** Sponsoring Scientist: Tobias Colding, MIT
2019–2022	**NSF Research Training Group Fellowship.** Dynamics, Probability, and PDEs in Pure and Applied Mathematics (DMS-1645643)
2020	**Robert John Bättig Award.** Cornell University, Department of Mathematics *"Recipients of the Bättig Prize are selected based on excellence and promise in mathematics. The award is given to graduate students who have passed their A exam (candidacy exam)."*
2016–2017	**First Year Fellowship.** Cornell University, Department of Mathematics
2016	**Chester Luther Award for Graduating Seniors.** Willamette University, Department of Mathematics
	Phi Beta Kappa Membership. Oregon Delta Chapter

Miscellaneous

Languages	English (native), Japanese (elementary)
Programming	Python (NumPy, plotly, pandas), Mathematica, MATLAB, Java, Haskell, HTML
Citizenship	United States