

ELLA M. KING

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EDUCATION

Harvard University

Physics Ph.D., National Science Foundation (NSF) Fellow

September 2018 – May 2023

Stanford University

Physics B.S., Math Minor

September 2014 – June 2018

RESEARCH EXPERIENCE

Simons Junior Fellow

NYU Center for Soft Matter Research, Flatiron Institute Center for Computational Biology

Non-equilibrium statistical mechanics, active matter, biological transport

September 2023 - Present

Graduate Student Researcher

Advisor: Michael Brenner; Harvard University

Inverse design of functional materials, self-assembly, optimization and inference in stochastic soft matter systems

January 2019 – June 2023

Undergraduate Researcher

Advisor: Nicholas Melosh; Stanford University

Computational studies of the impact of molecular rigidity on diamondoid self-assembly

June 2016 – June 2018

PUBLICATIONS AND PREPRINTS

King, E. M., Gounaris, G., Brown, L., Melbourne, A., Katifori, E. “Development and growth of placental chorionic vasculature” *In prep.*

King, E. M.*, Morrell, M.C.*, Sustiel, J.B, Gronert, M., Pastor, H., Grier, D.G. “Scattered waves fuel emergent activity” *ArXiv 2404.17410*

Krueger, R.K.*, **King, E.M.***, Brenner, M.P., “Tuning colloidal reactions.” *Physical Review Letters*. 133.22 (2024): 228201. *Editor’s Suggestion.*

King, E. M.*, Du, C.X.*, Zhu, Q.Z., Schoenholz, S.S., Brenner, M.P. “Programmable patchy particles for materials design”. *Proceedings of the National Academy of Sciences* 121.27 (2024): e2311891121.

Grier, D.G., **King, E. M.**, Morrell, M.C.. “Thunder and lightning: a revolution in wave-matter interactions”

King, E. M.*, Engel, M.C.*, Martin, C.S., Schoenholz, S.S., Manoharan, V.N., Brenner, M.P. “Inferring interaction potentials from stochastic particle trajectories”. *arXiv:2406.01522* (2024).

Kimchi, O., **King, E. M.**, and Brenner, M. P. (2023). “Uncovering the mechanism for aggregation in repeat expanded RNA reveals a reentrant transition” *Nature Communications*, 14(1), 332.

King, E. M.[†], Wang, W., Weitz, D. A., Spaepen, F., & Brenner, M.P. “Correlation Tracking: Using simulations to interpolate highly correlated particle tracks.” *Physical Review E* 105.4 (2022): 044608.

Goodrich, C. P.*, **King, E. M.***, Schoenholz, S. S., Cubuk, E. D., & Brenner, M. P. (2021). “Designing self-assembling kinetics with differentiable statistical physics models.” *Proceedings of the National Academy of Sciences*, 118(10).(2021): e2024083118

King, E. M., Gebbie, M. A., & Melosh, N. A. (2019). “Impact of Rigidity on Molecular Self-Assembly.” *Langmuir*, 35(48), 16062-16069.

*Co-first author publication

† Corresponding author

HONORS AND AWARDS

Simons Foundation Junior Fellowship	Sept 2023 - Present
MIT Chemical Engineering Rising Stars Workshop	Sept 25-27, 2024
University of Washington Distinguished Young Scholars Seminar	July 9, 2024
Emerging Soft Matter Excellence Award Finalist	Symposium Mar 7, 2023
Rising Stars in Soft and Biological Materials Symposium	Oct 6-7, 2022
NSF Graduate Research Fellow	Tenure in 2019, 2020, 2023
Two Sigma PhD Fellowship Finalist	2020 – 2021
Certificate of Distinction in Teaching	Fall 2020

PRESENTATIONS

Inverse design of bio-inspired materials *Statistical Mechanics and Molecular Simulation Seminar* (Invited Talk; October 2024)

Designing bio-inspired properties in self-assembled materials *University of Washington Distinguished Young Scholars Seminar* (Invited Talk; July 2024)

Inverse design with differentiable patchy particles *SIAM Mathematical Aspects of Materials Science* (Invited Talk; May 2024)

Emergent activity in wave-mediated interactions *University of Pennsylvania Soft Matter Theory Seminar, Philadelphia, PA* (Invited Talk; April 2024)

Inverse design of functional materials *NYU Courant Modeling and Simulation Group Seminar, New York, NY* (Talk; November 2023)

Introduction to Automatic Differentiation *Flatiron Center for Computational Biology - Inference Group, New York, NY* (Talk; November 2023)

Inferring interaction potentials from particle trajectories *APS March Meeting, Las Vegas NV* (Award Session Talk; March, 2023)

An Introduction to End-to-End Differentiable Atomistic Simulations with JAX MD *MRS Meeting; Boston, MA* (Tutorial Instructor; November 2022)

Using simulation to interpolate highly correlated particle tracks *Beg Rohu Summer School; St. Pierre Quiberon, France* (Poster; June 2022)

Designing kinetic features of self assembly *Geilo School; Geilo, Norway* (Poster; March, 2022)

Inverse design of nucleation seeds *APS March Meeting, Chicago IL* (Talk; March, 2022)

Tuning Kinetic Properties of Self-Assembled Systems *APS March Meeting; Virtual* (Talk; March, 2021)

TEACHING

Teaching Fellow for Applied Math 201: Physical Mathematics I (Fall 2020). Course given online. Ran sections, graded, aided in course organization. Awarded Certificate of Distinction in Teaching.

MENTORSHIP

New York University

- Mia Morrell *PhD Candidate*
- Matthew Gronert *PhD Candidate*
- Hayden Pastor *Undergraduate*
- Maria Jose Mendoza *Undergraduate*

Harvard University

- Ryan Krueger *PhD Candidate*
- Qian-Ze Zhu *PhD Candidate*
- Nihal Raman *Undergraduate Thesis*
- Cassia Lee *Undergraduate*

OUTREACH

- **Americal Physical Society DSOFT Postdoctoral Representative:** Elected position. Serving on the Communications and Outreach Committee and helping to organize the annual March Meeting Short Course and Tutorials.
- **Mentor for BioBus Junior Scientist Internship:** advised a high school student in a Manhattan public school on a research project from conception through poster presentation
- **Diversity, Equity & Inclusion Committee at NYU:** worked to develop equitable practices for admitting graduate students, helped organize CUWiP (Conference for Undergraduate Women in Physics) 2025
- **Outreach Director and board member for WoWSTEM:** Communicated with press outlets, organized advertising, and edited blog posts for wowstem.org, a website aimed at making advanced STEM topics accessible to middle and high school girls
- **Women in Physics at Harvard:** created and ran an annual website-making event for undergraduate and graduate women, helped organize a workshop on Building Inclusive Community
- **Harvard Polaris mentorship program:** Mentored three undergraduate women in physics at Harvard; Developed programming and recruited graduate mentors for Polaris
- **Diversity, Inclusion and Belonging Committee at Harvard:** Member of a working group that initiated a postbac program for underrepresented students that is ongoing today