

# ELLA M. KING

◇ ella.king@northwestern.edu

## EDUCATION

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### Harvard University

September 2018 – May 2023

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

### Stanford University

September 2014 – June 2018

Physics B.S., Math Minor

## POSITIONS

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### Assistant Professor, Northwestern University

Starting September 2026

*Chemical & Biological Engineering and Materials Science & Engineering*

### Simons Junior Fellow

September 2023 - August 2026

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

Non-equilibrium statistical mechanics, active matter, biological transport

### Graduate Student Researcher

January 2019 – June 2023

*Advisor: Michael Brenner; Harvard University*

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

### Undergraduate Researcher

June 2016 – June 2018

*Advisor: Nicholas Melosh; Stanford University*

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

## PUBLICATIONS AND PREPRINTS

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**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”. *Physical Review Research* (2025): 7, no. 2 (2025): 023075. *Editor’s Suggestion*.

**King, E. M.\***, Morrell, M.C.\*, Sustiel, J.B, Gronert, M., Pastor, H., Grier, D.G. “Scattered waves fuel emergent activity” *Physical Review Research* 7.1 (2025): 013055.

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”

Zhu, Q.Z, Du, C.X., **King, E.M.**, Brenner, M.P. ”Proofreading mechanism for colloidal self-assembly.” *Physical Review Research* 6, no. 4 (2024): L042057.

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.<sup>†</sup>**, 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

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<b>Simons Foundation Junior Fellowship</b>	Sept 2023 - Present
<b>Statistical and Nonlinear Physics Junior Speaker Award Finalist</b>	March 17, 2025
<b>MIT Chemical Engineering Rising Stars Workshop</b>	Sept 25-27, 2024
<b>University of Washington Distinguished Young Scholars Seminar</b>	July 9, 2024
<b>Emerging Soft Matter Excellence Award Finalist</b>	Symposium Mar 7, 2023
<b>Rising Stars in Soft and Biological Materials Symposium</b>	Oct 6-7, 2022
<b>NSF Graduate Research Fellow</b>	Tenure in 2019, 2020, 2023
<b>Two Sigma PhD Fellowship Finalist</b>	2020 – 2021
<b>Certificate of Distinction in Teaching</b>	Fall 2020

## SELECTED PRESENTATIONS

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Designing dynamic and non-equilibrium materials *Frontiers in Applied & Computational Mathematics, Newark, NJ* (Invited Talk, June 2025)

Emergent activity arises from wave scattering *APS March Meeting, Anaheim CA* (Award Session Talk, March 2025)

Designing dynamic and non-equilibrium materials *APS March Meeting, Anaheim CA* (Invited Talk; March 2025)

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

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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.

## OUTREACH

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- **Americal Physical Society DSOFT Postdoctoral Representative:** Elected position. Chairing the Communications and Outreach Committee and helping 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
- **Committee for Community, Engagement & Excellence at NYU:** worked to develop equitable practices for admitting graduate students and evaluating faculty candidates, 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