ELLA M. KING

ella.king@northwestern.edu ⋄ 847-491-7255 ⋄ Northwestern Technological Institute E154

EDUCATION

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

Assistant Professor, Northwestern University September 2026 - Present
Chemical & Biological Engineering and Materials Science & Engineering
Affiliations: Applied Physics Graduate Program, National Institute for Theory and Mathematics in Biology

Simons Junior Fellow September 2023 - August 2026
NYU Center for Soft Matter Research, Flatiron Institute Center for Computational Biology
Advisor: David Grier

Non-equilibrium statistical mechanics, active matter, dynamical systems, biological transport

Graduate Student January 2019 – June 2023
Advisor: Michael Brenner; Harvard University

Inverse design of functional materials, self-assembly, bio-inspired design, 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

SELECTED PUBLICATIONS AND PREPRINTS

Gronert, M. K., Cao, B., **King, E. M.**, & Grier, D. G. (2026). Emergent activity powers a path to chaos for pairs of acoustically trapped spheres. *arXiv preprint* arXiv:2609.37946. *Submitted*

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.†, 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 - Aug 2026
Statistical and Nonlinear Physics Junior Speaker Award Finalist	March 17, 2025
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

SELECTED PRESENTATIONS

Designing dynamics in bio-inspired materials *Northwestern University Physics Colloquium* (Invited Talk, Oct 2026)

Designing dynamics in bio-inspired materials *University of Chicago AI+Science Seminar Series* (Invited Talk, Oct 2026)

Proofreading with limited energy *Biological Physics & Physical Biology Seminar, Virtual* (Invited Talk, August 2026)

Designing dynamic and non-equilibrium materials *Center for Soft and Living Matter, University of Pennsylvania, Philadelphia PA* (Invited Talk, March 2026)

Controlling dynamic and non-equilibrium materials *Institute for Fundamental Science, University of Oregon, Eugene OR* (Invited Talk, March 2026)

Kinetic Proofreading *Course in Molecular Biophysics, Calgary, Canada* (Guest Lecture, March 2026)

Emergent Activity *Levitated Matter Conference, Chicago, IL* (Invited Talk, October 2025)

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)

Designing dynamic and non-equilibrium materials *Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN* (Invited Seminar, March 2025)

Designing dynamic and non-equilibrium materials *Department of Chemical Environmental Engineering, Yale University, New Haven, CT* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Applied Mathematics, Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, MA* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Department of Chemical and Biological Engineering and Department of Materials Science and Engineering, Northwestern University, Evanston, IL* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Department of Chemical Engineering, University of California, Santa Barbara, Santa Barbara, CA* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Department of Physics, University of California, Berkeley, Berkeley, CA* (Invited Seminar, February 2025)

Designing dynamic and non-equilibrium materials *Center for the Study of Complex Systems, University of Michigan, Ann Arbor, MI* (Invited Seminar, January 2025)

Designing dynamic and non-equilibrium materials *Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN* (Invited Seminar, January 2025)

Designing dynamic and non-equilibrium materials *Department of Mechanical Engineering, Northwestern University, Evanston, IL* (Invited Seminar, January 2025)

Designing dynamic and non-equilibrium materials *Department of Chemistry, Columbia University, New York, NY* (Invited Seminar, January 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)

TEACHING

- **MSE 301**: Chemical Aspects of Engineering Materials, Spring 2027, Undergraduate course
- **ChBE 451**: Applied Molecular Modeling, Winter 2027 Graduate elective course, co-taught with Randall Snurr
- 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 & COMMITTEE ROLES

- **American Physical Society DSOFT Communications Committee Chair** Initiated the 'Research Highlights' series, direct outreach efforts on social media, lead and coordinate a team of seven people
- **American Physical Society DSOFT Early Career 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

OUTREACH AND COMMITTEE EVENTS

- **AIChE Session Co-Chair** for Active Synthetic and Biological Systems, Area 1J (Fluid Mechanics). November 2026.
- **Panelist for APS DBIO: Your GPS for Navigating the Global Physics Summit** Panelist for Zoom event geared at preparing early-stage graduate students for their first APS March Meeting attendance. March 2026.
- **Panelist for Simons Presents**: One of three panelists presenting as a part of 'Weaving Webs of Silk and Stories,' an hour-long public outreach event hosted by the Simons Foundation. February 2026.