Samuel L. Foley, Ph.D.

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updated: May 2026

Positions Held

Postdoctoral Researcher — July 2023 – Present
Johns Hopkins University — Baltimore, MD
Research Group of Professor Margaret Johnson, Biophysics Department

Education

Carnegie Mellon University — Pittsburgh, PA
Ph.D. in Physics — May 2023
Advisor: Markus Deserno
Thesis: Mechanics and Thermodynamics of Differentially Stressed Lipid Membranes: Theory and Coarse-Grained Simulation
M.S. in Physics — May 2020

Pennsylvania State University — University Park, PA
B.S. in Physics, with Honors and Highest Distinction — May 2016
Minors: Mathematics, Spanish

Publications

Journal Articles

7. Bouzos, N., **Foley, S. L.**, Potamianos, A., Jacobs, C. O., Johnson, M. E., Zeno, W. F. Clathrin is an Intrinsic Driver of Membrane Fission. (2026) *Submitted*

6. **Foley, S. L.**, & Johnson, M. E. Membrane-Associated Self-Assembly for Cellular Decision Making. *Physical Review Research* (2026) *Accepted*.

5. Soubias, O., **Foley, S. L.**, Jian, X., Jackson, R. A., Zang, Y., Rosenberg, E. M. Jr., Li, J., Heinrich, F., Johnson, M. E., Sodt, A. J., Randazzo, P. A., & Byrd, R. A. An active allosteric mechanism in ASAP1-mediated Arf1 GTP hydrolysis redefines PH domain function. *Nature Communications* **16**, 8701 (2025)

4. **Foley, S. L.** & Deserno, M. Asymmetric Membrane "Sticky Tape" Enables Simultaneous Relaxation of Area and Curvature in Simulation. *The Journal of Chemical Physics* **160** (2024)

3. **Foley, S. L.**, Varma, M., Hossein, A. & Deserno, M. Elastic and Thermodynamic Consequences of Lipid Membrane Asymmetry. *Emerging Topics in Life Sciences* **7,** 95–110 (2023)

2. **Foley, S. L.**, Hossein, A. & Deserno, M. Fluid-Gel Coexistence in Lipid Membranes under Differential Stress. *Biophysical Journal* **121,** 2997–3009 (2022)

1. **Foley, S. L.** & Deserno, M. Stabilizing Leaflet Asymmetry under Differential Stress in a Highly Coarse-Grained Lipid Membrane Model. *Journal of Chemical Theory and Computation* **16,** 7195–7206 (2020)

Book Chapters

2. Guo, S.†, **Foley, S.L.**†, & Johnson, M.E. Simulations of Biomolecular Self-Assembly with Stochastic Reaction-Diffusion Models. Accepted Chapter in: *Biomolecular Simulations—Methods in Molecular Biology*. Springer Nature, Eds. L. Stelzl and R. Covino (2026)

1. **Foley, S. L.** & Deserno, M. Quantifying Uncertainty in Trans-Membrane Stresses and Moments in Simulation. *Methods in Enzymology* **701,** 83–122 (2024)

† indicates equal author contributions.

Service

- Reviewer: *Nature Communications (2)*, *PRX Life (1)*
- Reviewer: JHU Office for Undergraduate Research Provost's Undergraduate Research Award — Fall 2023
- CMU Physics Graduate Admissions Committee — Spring 2020

Teaching & Mentoring

Carnegie Mellon University

Graduate Teaching Assistant

- Physics I for Engineering Students (Mechanics & Thermodynamics) — Fall 2017, Spring 2018, Fall 2018
- Physics I for Science Students — Fall 2022
- Physics II for Engineering Students (E&M) — Spring 2021, Fall 2021, Spring 2022
- Physics for Future Presidents (Non-STEM Majors) — Fall 2019

Undergraduate Research Mentoring

- Fred Dauphin: simulation of asymmetric membranes — 2019
- Derek Hamersly: simulating asymmetric membranes near phase transition — 2019

Johns Hopkins University

Undergraduate Research Mentoring

- Tatum Marye: comparison of capsid assembly kinetics from reaction-diffusion *vs.* Brownian dynamics — 2025

Awards

- Physics Department Teaching Award (Carnegie Mellon) — 2021–2022
- ARCS Scholarship (Achievement Rewards for College Scientists) — 2017–2020
- Graduate Student Assembly/Provost Conference Travel Award (Carnegie Mellon) — 2019
- Bert Elsbach Honors Scholarship in Physics (Penn State) — 2014
- Penn State-New York Times Civic Engagement Speaking Contest Finalist — 2013

Presentations

- *Simulating Macromolecular Self-Assembly for Cell Biology: Hands-on Practice with NERDSS* — Dec 2025
  Workshop: ASCB 2025, Co-led with Professor Margaret Johnson
- *Self-Assembly and Decision-Making in Endocytosis* — Oct 2025
  Talk: HHMI Janelia Junior Scientist Workshop on Theoretical Biophysics
- *Membrane-Associated Self-Assembly for Cellular Decision-Making* — Sep 2025
  Talk: JHU Soft Matter & Biological Physics Group Meeting
- *Protein Self-Assembly Senses Membrane Receptors* — Mar 2025
  Talk: APS Global Physics Summit
- *Protein Self-Assembly Senses Membrane Receptors* — Jan 2025
  Poster: Stochastic Physics in Biology GRC 2025
- *Binding Cargo Boosts Clathrin Adaptor Residence Time* — Feb 2024
  Poster: BPS Annual Meeting 2024
- *Letting Asymmetric Membranes Relax with Simulation Sticky Tape* — Dec 2023
  Talk: JHU Soft Matter & Biological Physics Group Meeting

- *Nano-Scale "Sticky Tape" Stabilizes Open-Edge Boundary Conditions in Simulations of Asymmetric Membranes* Feb 2023
  Poster: BPS Annual Meeting 2023
- *Mechanics and Thermodynamics of Differentially Stressed Lipid Membranes* Jan 2023
  Talk: Johnson Lab Job Talk
- *Nano-Scale "Sticky Tape" Stabilizes Open-Edge Boundary Conditions in MD Simulations of Membranes* Dec 2022
  Talk: APS MAS22 Meeting
- *Liquid-Gel Coexistence in Membranes under Differential Stress* Feb 2022
  Poster: BPS Annual Meeting 2022
- *Asymmetry and Phase Coexistence: From van der Waals to Lipid Bilayers* Nov 2021
  Talk: Plots and Scotch (CMU Biophysics Seminar)
- *Stabilizing Leaflet Asymmetry in a Highly Coarse-Grained Lipid Membrane Model* Feb 2021
  Poster: BPS Annual Meeting 2021
- *Stabilizing Leaflet Asymmetry under Differential Stress in a Highly Coarse-Grained Lipid Membrane Model* Nov 2020
  Talk: Plots and Scotch (CMU Biophysics Seminar)
- *Properties of Asymmetric Membranes from Coarse Grained Molecular Dynamics Simulations* Feb 2020
  Poster: BPS Annual Meeting 2020
- *Extending a Highly Coarse-Grained Lipid Model to Asymmetric Membranes for MD Simulations* Mar 2019
  Poster: BPS Annual Meeting 2019