

# Samuel L. Foley, Ph.D.

updated: Jan 2026

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## Positions Held

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### Postdoctoral Researcher

Johns Hopkins University  
Research Group of Professor Margaret Johnson, Biophysics Department

July 2023 – Present

Baltimore, MD

## Education

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### Carnegie Mellon University

Ph.D. in Physics  
Advisor: Markus Deserno  
Thesis: Mechanics and Thermodynamics of Differentially Stressed Lipid Membranes:  
Theory and Coarse-Grained Simulation

Pittsburgh, PA

May 2023

M.S. in Physics

May 2020

### Pennsylvania State University

B.S. in Physics, with Honors and Highest Distinction  
Minors: Mathematics, Spanish

University Park, PA

May 2016

## Publications

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### Journal Articles

6. **Foley, S. L.**, & Johnson, M. E. Membrane-Associated Self-Assembly for Cellular Decision Making. (2025) *In Review*.
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

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- 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

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### 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

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- 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

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- *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