Jordan L. Shivers

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Positions

2022–pres. Postdoctoral Fellow
University of Chicago, Chicago, IL
Advisors: Aaron Dinner and Suriyanarayanan Vaikuntanathan

Education

2022 **Ph.D.**, Chemical and Biomolecular Engineering
Rice University, Houston, TX
Thesis: Phase transitions in the rheology of biopolymer networks
Advisor: Fred MacKintosh

2016 **B.S.E.** with Honors (*cum laude*), Chemical and Biological Engineering
Princeton University, Princeton, NJ
Thesis: Microfluidic immobilization and subcellular imaging of developing *C. elegans*
Advisor: Cliff Brangwynne

Awards and honors

2023–pres. Eric and Wendy Schmidt AI+Science Postdoctoral Fellowship, *University of Chicago*
2022–2023 Kadanoff-Rice Postdoctoral Fellowship, *University of Chicago*
2022 Ralph Budd Award for best Ph.D. thesis in engineering, *Rice University*
2021 Alexei Likhtman Poster Prize, *Edwards Symposium, University of Cambridge*
2021 Best Applied Paper, *American Institute of Chemical Engineers, South Texas Section*
2021 Society of Rheology Student Travel Grant
2020, 2021 NASA/Texas Space Grant Consortium Graduate Fellowship
2020 Lodieska Stockbridge Vaughn Fellowship, *Rice University*
2020 Sunit Patel ‘85 Endowed Fellowship for Research Accomplishment, *Rice University*
2018 Riki Kobayashi Fellowship in Chemical Engineering, *Rice University*
2018 Oil & Gas High Performance Computing Conference Fellowship, *Ken Kennedy Institute*

Preprints

15. Redford, S. A., Colen, J., **Shivers, J. L.**, Zemsky, S., Molaei, M., Floyd, C., Ruijgrok, P. V., Vitelli, V., Bryant, Z., Dinner, A. R., and Gardel, M. L. “Motor crosslinking augments elasticity in active nematics.” arxiv:2308.16831 (2023)
14. Gannavarapu, A., Arzash, S., Muntz, I., **Shivers, J. L.**, Klianeva, A., Koenderink, G. H., and MacKintosh, F. C. “Effects of local incompressibility on the rheology of composite biopolymer networks.” arxiv:2306.03952 (2023)
13. **Shivers, J. L.**, Sharma, A. and MacKintosh, F. C. “Nonaffinity controls critical slowing down and rheology near the onset of rigidity.” arxiv:2203.04891 (2022)

Peer-reviewed publications

12. Syed, S., MacKintosh, F. C., and **Shivers, J. L.** "Structural Features and Nonlinear Rheology of Self-Assembled Networks of Cross-Linked Semiflexible Polymers." *Journal of Physical Chemistry B*, 126 (2022), 10741–10749. DOI: 10/grd3w3
11. Ferretti, F., Grosse-Holz, S., Holmes, C., **Shivers, J. L.**, Giardina, I., Mora, T., and Walczak, A. "Signatures of irreversibility in microscopic models of flocking." *Physical Review E*, 106 (2022), 034608. DOI: 10/jgx5
10. Pogoda, K., Byfield, F., Deptula, P., Cieśluk, M., Suprewicz, L., Sk lodowski, K., **Shivers, J. L.**, van Oosten, A., Cruz, K., Tarasovetc, E., Grischuk, E. L., MacKintosh, F. C., Bucki, R., Patteson, A. E. and Janmey, P. A. "Unique Role of Vimentin Networks in Compression Stiffening of Cells and Protection of Nuclei from Compressive Stress." *Nano Letters*, 22 (2022), 4725–4732. DOI: 10/gqt3jr
9. Arzash, S., **Shivers, J. L.** and MacKintosh, F. C. "Shear-induced phase transition and critical exponents in three-dimensional fiber networks." *Physical Review E*, 104 (2021), L022402. DOI: 10/gqt3ws
8. Song, D., **Shivers, J. L.**, MacKintosh, F. C., Patteson, A. E. and Janmey, P. A. "Cell-induced confinement effects in soft tissue mechanics." *Journal of Applied Physics*, 129 (2021), 140901. DOI: 10/gm4h8p
7. **Shivers, J. L.**, Feng, J., van Oosten, A. S. G., Levine, H., Janmey, P. A. and MacKintosh, F. C. "Compression stiffening of fibrous networks with stiff inclusions." *Proceedings of the National Academy of Sciences*, 117 (2020), 21037-21044. DOI: 10/gqt4cn
6. Arzash, S., **Shivers, J. L.** and MacKintosh, F. C. "Finite size effects in critical fiber networks." *Soft Matter*, 16 (2020), 6784-6793. DOI: 10/gqt4cp
5. **Shivers, J. L.**, Arzash, S. and MacKintosh, F. C. "Nonlinear Poisson effect governed by a mechanical critical transition." *Physical Review Letters*, 124 (2020), 038002. DOI: 10/gqt4cm
4. **Shivers, J. L.**, Arzash, S., Sharma, A. and MacKintosh, F. C. "Scaling theory for mechanical critical behavior in fiber networks." *Physical Review Letters*, 122 (2019), 188003. DOI: 10/gqt4ck
3. Arzash, S., **Shivers, J. L.**, Licup, A. J., Sharma, A. and MacKintosh, F. C. "Stress-stabilized subisostatic rope networks." *Physical Review E*, 99 (2019), 042412. DOI: 10/gqt34p
2. **Shivers, J. L.**, Feng, J., Sharma, A. and MacKintosh, F. C. "Normal stress anisotropy and marginal stability in athermal elastic networks." *Soft Matter*, 15 (2019), 1666-1675. DOI: 10/gqt34q
1. **Shivers, J.**, Uppaluri, S. and Brangwynne, C. P. "Microfluidic immobilization and subcellular imaging of developing *Caenorhabditis elegans*." *Microfluidics and Nanofluidics*, 21 (2017), 149. DOI: 10/gbx9s7

Invited talks

Sep. 2023	Morphological transitions in growing membranes *BIRS Workshop on Mechanics of Cells and Tissues, Banff, Alberta, CA*
Oct. 2021	Strain-induced critical slowing of stress relaxation in elastic networks *Soft Matter For All Symposium (virtual), University of Delaware and Princeton MRSEC*
Nov. 2020	Compression stiffening of fibrous networks with stiff inclusions *Patel Award Seminar (virtual), Rice University Chemical Engineering, Houston, TX*

Oct. 2020 Compression stiffening of fibrous networks with stiff inclusions
University of Pennsylvania MRSEC IRG2 Weekly Talks (virtual), Philadelphia, PA

Nov. 2019 Mechanics of semiflexible polymer network materials
Kobayashi Award Seminar, Rice University Chemical Engineering, Houston, TX

Contributed talks

Mar. 2023 Structural rearrangement and slow dynamics near the onset of rigidity
APS March Meeting, Las Vegas, NV

Oct. 2022 Nonaffinity-induced critical slowing down in fibrous networks and dense suspensions
Society of Rheology 93rd Annual Meeting, Chicago, IL

Aug. 2022 Strain-induced critical slowing of stress relaxation in disordered networks
Texas Soft Matter Meeting, Austin, TX

Jun. 2022 Strain-induced critical slowing of stress relaxation in disordered networks
US National Congress on Theoretical and Applied Mechanics Austin, TX

May 2022 Strain-induced critical slowing of stress relaxation in disordered networks
International Physics of Living Systems Annual Meeting, Montpellier, France

Mar. 2022 Strain-induced critical slowing of stress relaxation in disordered networks
APS March Meeting, Chicago, IL

Nov. 2021 Compression stiffening of fibrous networks with stiff inclusions
AIChE Annual Meeting, Boston, MA

Oct. 2021 Strain-induced critical slowing of stress relaxation in elastic networks
Society of Rheology 92nd Annual Meeting, Bangor, ME

Mar. 2021 Compression stiffening of fibrous networks with stiff inclusions
APS March Meeting (virtual)

Dec. 2020 Compression stiffening of fibrous networks with stiff inclusions
International Congress on Rheology (virtual), Rio de Janeiro, Brazil

Mar. 2020 Nonlinear Poisson effect in critical mechanical networks
APS March Meeting (virtual), Denver, CO

Feb. 2020 Nonlinear Poisson effect in critical mechanical networks
Smalley-Curl Institute Transdisciplinary Symposium, Houston, TX

Oct. 2019 Nonlinear Poisson effect in critical mechanical networks
Society of Rheology 91st Annual Meeting, Raleigh, NC

Mar. 2019 Scaling theory for critical mechanical behavior in fiber networks
APS March Meeting, Boston, MA

Oct. 2018 Scaling theory for critical mechanical behavior in fiber networks
Society of Rheology 90th Annual Meeting, Houston, TX

Jun. 2018 Mechanics of fibrous networks with embedded inclusions
International Physics of Living Systems Annual Meeting, Houston, TX

Mar. 2018 Anomalous normal stress controlled by marginal stability in fiber networks
APS March Meeting, Los Angeles, CA

Contributed posters

Aug. 2023 Morphological transitions in growing membranes
Eric & Wendy Schmidt AI in Science Fellowship Annual Convening, Toronto, CA

Mar. 2023 Constraining morphological transitions in growing membranes
U. Chicago–Caltech Conference on AI+Science, Chicago, IL

Sep. 2021 Strain-induced critical slowing of stress relaxation in elastic networks
5th Edwards Symposium, Edwards Centre for Soft Matter, Cambridge, UK

Aug. 2019	Nonlinear Poisson effect in critical mechanical networks *Gordon Research Conference on Soft Condensed Matter Physics, New London, NH*
Jun. 2019	Nonlinear Poisson effect in critical mechanical networks *Boulder Summer School for Condensed Matter and Materials Physics, Boulder, CO*
Jun. 2019	Nonlinear Poisson effect in critical mechanical networks *International Soft Matter Conference, Edinburgh, UK*
Mar. 2019	Nonlinear Poisson effect in critical mechanical networks *APS March Meeting, Boston, MA*

External courses

2019	Boulder School for Condensed Matter and Materials Physics *Topic: Theoretical Biophysics (3 weeks)*

Teaching

Spring 2019	Teaching Assistant, Rice Univerity, CHBE 603: Rheology
Fall 2017	Teaching Assistant, Rice Univerity, CHBE 401: Transport Phenomena I
Spring 2017	Teaching Assistant, Rice Univerity, CHBE 402: Transport Phenomena II
Fall 2016	Teaching Assistant, Rice Univerity, CHBE 403: Design Fundamentals

Professional activities

2019–present	**Journal referee**, *Proceedings of the National Academy of Sciences, Physical Review Letters, Physical Review X, Physical Review E, Biophysical Journal, Soft Matter, Macromolecules, Acta Biomaterialia*

Service

2023	Co-organizer for 5-day machine learning workshop *University of Chicago AI in Science Summer School*
2021–2022	Research mentor for one undergraduate student *Frontiers in Science REU Program, Center for Theoretical Biological Physics*
2021	Volunteer physics tutor *NEWT K-12 Tutoring Program, Rice University*
2017-2018	Graduate recruitment co-chair *Chemical Engineering Graduate Student Association, Rice University*
2017-2019	Residential college graduate fellow *Duncan College, Rice University*
2017-2018	Member, Dean's Engineering Student Advisory Council *School of Engineering, Rice University*
2017	Judge for undergraduate research presentations *Gulf Coast Undergraduate Research Symposium, Rice University*

Skills

Programming: C/C++, Python, Java, Mathematica, MATLAB, R, LaTeX