

Nan Xue

CONTACT INFORMATION

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PROFESSIONAL EXPERIENCE

Cornell University

Ithaca, NY, USA

Postdoctoral researcher in Department of Physics
Advisor: Eric R. Dufresne

July 2023 - present

ETH Zürich

Zürich, Switzerland

Postdoctoral researcher in Department of Materials
Advisor: Eric R. Dufresne

Sep. 2021 - June 2023

EDUCATION

Princeton University

Princeton, NJ, USA

Ph.D. in Mechanical and Aerospace Engineering

Sep. 2016 - July 2021

M.A. in Mechanical and Aerospace Engineering

Apr. 2018

Advisor: Howard A. Stone

Thesis: *Gravity-induced flows: buoyancy-driven flows and interfacial thin-film flows*

Tsinghua University

Beijing, China

B.S. in Engineering Mechanics

Aug. 2011 - July 2015

SELECTED SCHOLARSHIPS & AWARDS

- Charlotte Elizabeth Procter Fellowship (Honorific), *Princeton University* 2020
- Britt and Eli Harari Fellowship, *Princeton University* 2018
- Howard Crathorne Phillips Fellowship, *Princeton University* 2017
- Annual Influential Student in School of Aerospace, *Tsinghua University* 2015
- Meritorious Winner in Mathematical Contest in Modeling, *USA* 2014
- Scholarship of Tsien Hsue-shen Elite Class, *Tsinghua University* 2011 - 2014
- Gold Medal in 27th Chinese Physics Olympiad, *China* 2010

PUBLICATIONS

Journal Papers

17. N. Xue, L. A. Wilen, R. W. Style, E. R. Dufresne, *Droplets sliding on soft solids shed elastocapillary rails*, **Soft Matter**, 2025. <https://doi.org/10.1039/D4SM01041H>.
16. A. Slowicka*, N. Xue*, L. Liu*, J. K. Nunes, P. Sznajder, H. A. Stone, M. Ekiel-Jezewska, *Highly elastic fibers in a shear flow can form double helices*, **New Journal of Physics**, 2024. <https://doi.org/10.1088/1367-2630/ad56c0>. (*equal contribution)
15. N. Xue, R. Long, E. R. Dufresne, R. W. Style, *Elastomers fail from the edge*, **Physical Review X**, 2024. <https://doi.org/10.1103/PhysRevX.14.011054>.
14. S. Sun, N. Xue, S. Aime, H. Kim, J. Tang, G. H. McKinley, H. A. Stone, and D. A. Weitz, *Anomalous crystalline ordering of particles in a viscoelastic fluid under high shear*, **Proceedings of the National Academy of Sciences**, 2023. <https://doi.org/10.1073/pnas.2304272120>.
13. P. R. Kaneelil, A. A. Pahlavan, N. Xue, and H. A. Stone, *Three-dimensional self-similarity of coalescing viscous drops in the thin-film regime*, **Physical Review Letters**, 2022. <https://doi.org/10.1103/PhysRevLett.129.144501>.

12. A. Słowicka, N. Xue, P. Sznajder, J. K. Nunes, H. A. Stone, M. Ekiel-Jezewska, *Short-time 3D dynamics of flexible fibers in shear flow*, **New Journal of Physics**, 2022. <https://doi.org/10.1088/1367-2630/ac43eb>.
11. N. Xue, H. A. Stone, *Gravitational drainage on a vertical substrate of a narrow width*, **Physical Review Fluids**, 2022. <https://doi.org/10.1103/PhysRevFluids.7.014001>.
10. A. Giri, N. Biswas, D. L. Chase, N. Xue, M. Abkarian, S. Mendez, S. Saha, H. A. Stone, *Colliding respiratory jets as a mechanism of air exchange and pathogen transport during conversations*, **Journal of Fluid Mechanics**, 2022. <https://doi.org/10.1017/jfm.2021.915>.
9. N. Xue, J. K. Nunes, H. A. Stone, *Shear-induced migration of confined flexible fibers*, **Soft Matter**, 2022. <https://doi.org/10.1039/D1SM01256H>.
8. P. Bourrianne, N. Xue, J. K. Nunes, M. Abkarian, H. A. Stone, *Quantifying the effect of a mask on expiratory flows*, **Physical Review Fluids**, 2021. <https://doi.org/10.1103/PhysRevFluids.6.110511>.
7. N. Xue, H. A. Stone, *Draining and spreading along geometries that cause converging flows: Viscous gravity currents on a downward-pointing cone and a bowl-shaped hemisphere*, **Physical Review Fluids**, 2021. <https://doi.org/10.1103/PhysRevFluids.6.043801>.
6. M. Abkarian, S. Mendez, N. Xue, F. Yang, H. A. Stone, *Speech can produce jet-like transport relevant to asymptomatic spreading of virus*, **Proceedings of the National Academy of Sciences**, 2020. <https://doi.org/10.1073/pnas.2012156117>.
5. N. Xue, H. A. Stone, *Self-similar draining near a vertical edge*, **Physical Review Letters**, 2020. <https://doi.org/10.1103/PhysRevLett.125.064502>.
4. N. Xue, M. Y. Pack, H. A. Stone, *Marangoni-driven film climbing on a draining pre-wetted film*, **Journal of Fluid Mechanics**, 2020. <https://doi.org/10.1017/jfm.2019.1071>.
3. N. Xue, S. Khodaparast, H. A. Stone, *Fountain mixing in a filling box at low Reynolds numbers*, **Physical Review Fluids**, 2019. <https://doi.org/10.1103/PhysRevFluids.4.024501>.
2. N. Xue, S. Khodaparast, L. Zhu, J. K. Nunes, H. Kim, H. A. Stone, *Laboratory layered latte*, **Nature Communications**, 2017. <https://doi.org/10.1038/s41467-017-01852-2>.
Nature research highlights: [How warm milk generates latte layers](#)
The New York Times: [How layers in a latte form](#)
1. N. Xue, W. Shuai, S. Sun, D. Quéré, Q. Zheng, *Strongly metastable assemblies of particles at liquid interfaces*, **Langmuir**, 2014. <https://doi.org/10.1021/la503938a>.

PRESENTATIONS

Invited Talks

6. N. Xue, *Exploring three-dimensional self-similarity: From falling films to failing elastomers*, Department of MAE, University of Florida, FL, USA, February 2025.
5. N. Xue, *Exploring three-dimensional self-similarity: From falling films to failing elastomers*, School of MAE, Nanyang Technological University, Singapore, January 2025.
4. N. Xue, *Exploring the mechanics and physics from elastomers to living materials*, Cornell Soft Matter Hub, Cornell University, Ithaca, NY, USA, March 2024.
3. N. Xue, *Cutting-edge fracture: elastomers fail from the edge*, LASSP/AEP Student Seminar Series, Cornell University, Ithaca, NY, USA, February 2024.
2. N. Xue, *Exploring three-dimensional self-similarity: From falling films to failing elastomers*, DAMTP, University of Cambridge, Cambridge, UK, January 2024.
1. N. Xue, R. Long, E. R. Dufresne, R. W. Style, *Elastomers fail from the edge*, CECAM Flagship Workshop - 3D cracks and crack stability, Lausanne, Switzerland, June 2023.

Conference Presentations

10. N. Xue, R. E. Schnirman., L. B. Huberman, E. R. Dufresne, *Macroscopic directional growth of Neurospora crassa in response to nutrient gradients*, Neurospora 2025 Conference, Schroom Lake, NY, USA, October 2025.
9. N. Xue, L. Wilen, R. W. Style, E. R. Dufresne, *Riding on elastocapillary rails*, 76th Annual Meeting of the APS DFD, Washington, DC, USA, November 2023.
8. N. Xue, L. Wilen, R. W. Style, E. R. Dufresne, *Elastocapillary wake*, 75th Annual Meeting of the APS DFD, Indianapolis, IN, USA, November 2022.
7. N. Xue, J. K. Nunes, H. A. Stone, *Shear-induced migration of confined flexible fibers*, 74th Annual Meeting of the APS DFD, Phoenix, AZ, USA, November 2021.
6. N. Xue, H. A. Stone, *A novel form of self-similarity: Drainage near a vertical edge - from 3 Variables to 1*, Gallery of Fluid Motion, 73th Annual Meeting of the APS DFD, Virtual, November 2020. <https://doi.org/10.1103/APS.DFD.2020.GFM.V0021>.
5. N. Xue, H. A. Stone, *Self-similar draining near a vertical edge*, 73th Annual Meeting of the APS DFD, Virtual, November 2020.
4. N. Xue, M. Y. Pack, H. A. Stone, *Marangoni-driven film climbing on a draining pre-wetted film*, 72th Annual Meeting of the APS DFD, Seattle, WA, USA, November 2019.
3. N. Xue, S. Khodaparast, H. A. Stone, *Fountain entrainment in a filling box at low Reynolds numbers*, 71th Annual Meeting of the APS DFD, Atlanta, GA, USA, November 2018.
2. N. Xue, S. Khodaparast, L. Zhu, J. K. Nunes, H. Kim, H. A. Stone, *Laboratory layered latte*, 70th Annual Meeting of the APS DFD, Denver, CO, USA, November 2017.

Posters

4. N. Xue, R. E. Schnirman., L. B. Huberman, E. R. Dufresne, *Macroscopic directional growth of Neurospora crassa in response to nutrient gradients*, Neurospora 2025 Conference, Schroom Lake, NY, USA, October 2025.
3. N. Xue, R. Long, E. R. Dufresne, R. W. Style, *Fracture on the edge: Thicker elastomers are tougher*, PCTS Workshop, Princeton University, Princeton, NJ, USA, May 2024. (with a poster prize)
2. N. Xue, L. B. Huberman, M. N. Silberstein, E. R. Dufresne, *Physics of engineered living materials, diatom + mycelium as a model platform*, ELMI Annual Research Symposium, Cornell University, Ithaca, NY, USA, April 2024.
1. N. Xue, R. Long, E. R. Dufresne, R. W. Style, *Fracture on the edge: Thicker elastomers are tougher*, Soft Condensed Matter Physics Conference GRC, New London, NH, USA, August 2023.

TEACHING EXPERIENCE

ETH Zürich

Zürich, Switzerland

Co-lecturer, 327-0515-00L: "Thermal and Transport Properties"

Fall 2022

- Develop course, including lecture notes and problem sets, and hold lectures and discussions.

Princeton University

Princeton, NJ, USA

Assistant Instructor, MAE221: "Thermodynamics"

Fall 2017 & 2018 & 2019

- Mentor other teaching assistants, design setups, hold precepts, instruct labs, grade assignments, and provide engineering design consultations.

Assistant Instructor, MAE552: "Viscous Flows and Boundary Layers"

Spring 2019

- Hold precepts and office hours, grade assignments and exams.

SERVICE

Outreach

- Harlem Prep Elementary School visit day in Princeton 2017 & 2018
- Design and demonstrate hands-on mechanical engineering experiments and games for elementary school students.
- Science Day/Dia de la Ciencia in Princeton 2019
- Design and demonstrate hands-on Schlieren imaging experiments (wake visualization) for elementary and middle school students.
- Virtual science outreach at the Riverside Elementary School (New Jersey, USA) 2021
- Design and demonstrate experiments (diffusion and mixing) to help elementary school students to learn about matter.
- Nachaktiv (Zürich, Switzerland) 2022
- Design and demonstrate experiments (such as microscopy imaging butterfly wings) to help youth and young adults (ages 16 - 25) explore structural color.

MENTORSHIP

Jemma Gillon (Nov. 2024 - present)

Visiting master student from Department of Materials, ETH Zürich, Switzerland

Email: gillonj@student.ethz.ch

Harsha Koganti (Sep. 2023 - present)

Master student in Department of Materials Science and Engineering, Cornell University, USA

Email: hk796@cornell.edu

REFERENCES

Howard A. Stone (Ph.D. Advisor)

*Donald R. Dixon '69 and Elizabeth W. Dixon Professor,
Mechanical & Aerospace Engineering, Princeton University*

G02 Equad, Princeton, NJ 08544, USA

Email: hastone@princeton.edu

Eric R. Dufresne (Postdoctoral Advisor)

*Professor in Laboratory of Atomic and Solid-State Physics
and Department of Materials Science and Engineering, Cornell University*

538 Clark Hall, Ithaca, NY 14853, USA

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Rong Long (Collaborator)

*Associate Professor in Department of Mechanical Engineering,
University of Colorado Boulder*

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Robert W. Style (Collaborator)

Group leader in Department of Materials, ETH Zürich

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