

Christopher M. Ushay, Ph.D.

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Summary

Princeton-trained engineering PhD with deep expertise in computational modeling, experimental research, data science, and technical communication. Has driven complex, ambiguous projects from open questions to validated outcomes while translating findings for diverse audiences. Searching for roles connected to data-driven insights, innovation, and program management in quantitative, high-impact settings.

Education

Princeton University

Princeton, NJ

Ph.D., Chemical & Biological Engineering

- Dissertation - "Leveraging Relationships Between Confined Flows and Deformable Media," under advisor Prof. Pierre-Thomas Brun

William E. Macaulay Honors College, City University of New York

New York, NY

Bachelor of Engineering, Chemical Engineering, Mathematics Minor

- GPA - 3.96/4.00 | Valedictorian, Grove School of Engineering

Work Experience

Doctoral Researcher

Princeton, NJ

Lab of Pierre-Thomas Brun, Department of Chemical & Biological Engineering, Princeton University

January 2019 - May 2024

- Led independent and collaborative research campaigns from concept through refinement and validation, implementing project roadmaps, iterative design, and cross-functional communication with research stakeholders
- Produced a dissertation exploring open questions in mechanics and materials science by distilling research findings into short- and long-form narratives, including multiple peer-reviewed articles in high-impact journals and a cover page feature
- Wrote and automated data science scripts in Python and Mathematica to convert collected information into numerical data, manipulate and analyze large datasets, and visualize relationships to glean meaningful insights from experiments
- Built predictive 2D and 3D multiphysics models to capture the behavior of nonlinear mechanical phenomena, validate observations against theory, and expand experimental design spaces
- Communicated research findings to global scientific audiences through nearly 10 presentations at major physics conferences and multi-lab collaborations, supported by original figures and multimedia produced in Adobe CC, AutoCAD, and Keynote

Assistant in Instruction

Princeton, NJ

School of Engineering & Applied Science, Princeton University

January 2020 - December 2022

- Recognized with Princeton University's annual Excellence in Teaching Award, as nominated by students, for the instruction of Undergraduate Differential Equations (Spring '20, '21) and Graduate Soft Matter Mechanics (Fall '22)
- Taught classes of 70+ undergraduate students introductory to advanced topics in math and physics, spanning classical theory and modern computational tools, by leading weekly lectures, office hours, and ongoing availability as a dedicated resource

Head Manager

Princeton, NJ

Debasement Bar, Student-Run Hospitality Venture, Princeton University

July 2021 - December 2023

- Managed full P&L operations of a hospitality business, overseeing a 20+ person team, regulatory compliance, and financial reporting with revenue on the order of tens of thousands
- Maintained facilities (equipment, consumables) and developed data-driven longevity plans with co-managers to ensure continued improvement beyond tenures, including programs to enhance experiences such as the implementation of ride-share vouchers for patrons
- Programmed nightly events for hundreds of graduate students and affinity groups in order to provide gathering space and foster university community

Machine Learning Research Assistant

New York, NY

Element, Inc.

October 2017 - August 2018

- Contributed to a \$12M Series A growth phase with cross-functional exposure across Operations and Engineering, including hiring, onboarding, and company culture development
- Processed and filtered biometric data to support training of an ML-based identification platform targeting underserved markets in developing economies

Skills & Interests

- Software & Data Science** - Python (inc. NumPy, pandas, Matplotlib, PyTorch); Mathematica; SQL; COMSOL; MATLAB; C; Julia
- Fabrication & Analysis** - Laser cutting; CNC milling; 3D printing; digital photography; high-speed imaging; microscopy
- Design & Visualization** - Adobe CC (Illustrator, Photoshop); Keynote/PowerPoint; AutoCAD; Fiji
- Languages** - English (fluent); French (CEFR C1); German (CEFR A2); Japanese (elementary)

Publications

- **Ushay, C.**, Jambon-Puillet, E., Brun, P.-T. (2023) “Interfacial flows through arrays of elastic fibers” *Physical Review Fluids*, DOI: 10.1103/PhysRevFluids.8.044001
- Badaoui, M., Kresge, G., **Ushay, C.**, Marthelot, J., Brun, P.-T. (2022) “Formation of Pixelated Elastic Films via Capillary Suction of Curable Elastomers in Templated Hele–Shaw Cells” *Advanced Materials*, DOI: 10.1002/adma.202109682
- Travlou, N.A., **Ushay, C.**, Seredych, M., Rodriguez-Castellon, E., Bandosz, T.J. (2016) “Nitrogen-Doped Activated Carbon-Based Ammonia Sensors: Effect of Specific Surface Functional Groups on Carbon Electronic Properties” *ACS Sensors*, DOI: 10.1021/acssensors.6b00093

Honors & Awards

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| 2022 | Cover Page Feature , <i>Advanced Materials</i> , Volume 34, Issue 27 | <i>Print & Online</i> |
| 2021 | Excellence in Teaching Award , Princeton University | <i>Princeton, NJ</i> |
| 2017 | Valedictorian , Grove School of Engineering, City College of New York | <i>New York, NY</i> |
| 2017 | Alumni Medal for Highest Departmental GPA , Grove School of Engineering, City College of New York | <i>New York, NY</i> |

Presentations, Exhibitions, & Press

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| 2024-25 | Rope Piece (Deluge); Deluge 2; Deluge 3 , Traveling Gallery of Fluid Motion: Spiraling Upwards | <i>Salt Lake City, UT</i> |
| | | Sculpture |
| 2023 | “Elastocapillary painting: deposition of fluid trapped within fibre arrays” , American Physical Society March Meeting 2023 | <i>Las Vegas, NV</i> |
| | | Presentation |
| 2022 | “Hairy fluid mechanics: Dynamic elastocapillarity in deformable beam arrays” , 75th Annual Meeting of the Division of Fluid Dynamics | <i>Indianapolis, IN</i> |
| | | Presentation |
| 2022 | “Fluid mediated assembly of pixelated materials” , 75th Annual Meeting of the Division of Fluid Dynamics | <i>Indianapolis, IN</i> |
| | | Presentation |
| 2022 | “Hairy fluid mechanics: interfacial flows through networks of flexible fibres” , 19th U.S. National Congress on Theoretical and Applied Mechanics | <i>Austin, TX</i> |
| | | Presentation |
| 2022 | “Easy as an inkjet, a new soft printing technique has opened the way for pixelated elastics” , Princeton University Communications | <i>Online</i> |
| | | Article |
| 2021 | “Hairy fluid mechanics: interfacial flows in networks of flexible fibres” , 74th Annual Meeting of the Division of Fluid Dynamics | <i>Phoenix, AZ</i> |
| | | Presentation |
| 2020 | “Fluid Capture Patterns in Hairy Surfaces” , 73rd Annual Meeting of the Division of Fluid Dynamics | <i>Online</i> |
| | | Presentation |
| 2020 | “Multiphase Flow Through Hairy Channels” , American Physical Society March Meeting 2020 | <i>Online</i> |
| | | Presentation |