# Molly Carton, PhD

(240)380-0184 • mcarton@mit.edu
**Postdoctoral Fellow – Portela Group, MIT**

## Education

**PhD in Mechanical Engineering** 2015–2022
University of Washington – Seattle, WA
Dissertation: *Programming Structures for Transformative Robotics and Devices*
Committee Chair: Jeffrey Ian Lipton
GPA 3.85

**MS in Applied Math** 2017–2018
University of Washington – Seattle, WA

**Graduate Studies in Mechanical Engineering** 2014–2015
University of Maryland – College Park, MD

**AB in Physics** 2010–2014
Princeton University – Princeton, NJ

## Research Interests

Computational fabrication • Metamaterials • Computational design
Additive manufacturing • Geometric computing • Soft and materials robotics

## Awards and Honors

- MIT School of Engineering Postdoctoral Fellowship for Engineering Excellence (current)
- NEW.Mech 2023 – Best Teaser Talk
- MIT LEAPS Fellow
- Judge, 2023 MIT Mechanical Engineering Research Exhibition (MERE)
- ACTIVE: Faculty Development and Leadership Intensive – University of Colorado Boulder
- Mark and Lisa Tuttle Endowed Fellowship in Mechanical Engineering
- Steve and Lynn Pratt Fellowship
- Graduate School Top Scholar Fellowship Award – University of Washington

## Publications and Presentations

11. "A Compliant Metamaterial-Based Robotic Arm Element for Bending and Torsion" In preparation, 2023

10. **Carton, M.**, Surjadi, J., Aymon, B., and Portela, C., "Design Framework for Microscale 3D Woven Architected Materials" Presented at ACM Symposium on Computational Fabrication 2023 (SCF), New York, NY

9. "Generalized Framework for Woven Architected Lattices." Presented at NEW.Mech 2023, Boston, MA.

8. **Carton M.**, and Lipton, J. I. "Axial Point Group Auxetics with Emergent Rotational Responses." Presented at U.S. National Congress for Theoretical and Applied Mechanics 2022 (USNC/TAM) Austin, TX.

7. "Lattices and Groups". Guest talk, UW ME 599, Winter 2022.

6. **Carton, M.**, Nandi, C., Anderson, A., Zhao, H., Darulova, E., Grossman, D., Lipton, J.I., Schulz, A., Tatlock, Z. "A Roadmap Towards Parallel Printing for Desktop 3D Printers." In Proceedings, 2021 Annual International Solid Freeform Fabrication Symposium (SFF) Austin, TX.

5. "3D representations". Guest talk, UW ME 599, Winter 2021.

4. **Carton M.**, and Lipton, J. I. "Mechanical Metamaterial Continuum Materials Realized through 3D Printing using Compliant Mechanisms Techniques." In Proceedings, 2020 Society for the Advancement of Material and Process Engineering Conference (SAMPE) online due to COVID-19.

3. **Carton, M.**, and Ganter, M. "Fast and Simple Printing of Graded Auxetic Structures". In Proceedings, 2019 Annual International Solid Freeform Fabrication Symposium (SFF) Austin, TX.

2. Storti, D., Yurtoglu, M., **Carton, M.**, and Uchytil, C. "A Modern Voxel Approach to Numerical Integration on Implicit Domains using Python/Numba/CUDA" Poster presented at 2018 NVIDIA GPU Technology Conference (San Jose, CA)

1. Yurtoglu, M., **Carton, M.,** and Storti, D. "Treat All Integrals as Volume Integrals: A Unified, Parallel, Grid-Based Method for Evaluation of Volume, Surface, and Path Integrals on Implicitly Defined Domains." ASME J. Comput. Inf. Sci. Eng 18.2 (2018): 021013.

## Research and Employment

**Massachusetts Institute of Technology** • Portela Group 2022–present

*Postdoctoral Fellow.* • Design framework for compliant architected materials. Mechanics, simulation, fabrication and testing of micro-scale architectures fabricated with 2-photon lithography.

**University of Washington** • Transformative Robotics Laboratory 2019–2022

*Research Assistant.* • Group-theory approach to design and fabrication of mechanical metamaterials for compliant robotics.

**University of Washington** • Solheim Additive Manufacturing Laboratory 2015–2019
*Research Assistant.* • Design, construction, and testing of novel modeling and 3D printing techniques, with emphasis on GPU parallel computing.

**Teaching Assistant**

**University of Washington – Department of Mechanical Engineering**
ME 480: Introduction to Computer-Aided Technology. Spring 2017; Autumn 2020, 2021, 2022

**University of Washington – Department of Mechanical Engineering**
ME 498/599: Topics in Additive Manufacturing. Autumn 2017 & 2021

**Johns Hopkins Center for Talented Youth Summer Program**
Principles of Engineering Design. Summer 2019

**University of Washington – Department of Mechanical Engineering**
ME 230: Kinematics and Dynamics. *Online due to COVID-19.* Spring 2020

**Logos Technologies** Summer 2016
*Engineering Intern.* Developed image analysis software in MATLAB and Python and worked as onsite data analyst for field testing of wide-area surveillance imaging.

**Princeton University** • Shaevitz Laboratory 2013–2014
*Undergraduate Research Assistant.* • Tested, experimentally and in simulation, a new method for examining protein localization *in vivo* and cell wall curvature using atomic force microscopy.

**Princeton University** • advised by Professor Daniel Marlow 2012
*Undergraduate Research Assistant.* • Developed measurement and hardware for low-cost detection of cosmic background radiation.

**University of Maryland** • Collective Dynamics and Control Laboratory Summer 2012
*Undergraduate Research Assistant.* • Wrote and visualized MATLAB simulations in order to examine how collective behavior can arise from simple rules.

## Professional Associations

• American Society of Mechanical Engineers (ASME)