

# Emily Zhang

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## Education

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Massachusetts Institute of Technology

*Ph.D. Student in Operations Research, GPA: 4.9/5.0*

*Advisors: Prof. Georgia Perakis and Prof. Retsef Levi*

Cambridge, MA

September 2021 – Present

Massachusetts Institute of Technology

*B.S. in Computer Science & Mathematics, GPA: 5.0/5.0*

Cambridge, MA

September 2017 – June 2021

## Research Interests

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**Topics:** Optimization, machine learning, economics, statistics, causal inference, interpretability, combinatorial optimization

**Applications:** Sustainable operations, public-sector/nonprofit operations, nutrition assistance programs, food bank operations, inventory planning

## Publications/Completed Manuscripts

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1. **Approximation Algorithms for Inventory Problems with Decomposable Submodular Ordering Costs.**

Retsef Levi, Georgia Perakis, Emily Zhang. Soon to be submitted to *Mathematics of Operations Research*.

2. **Heterogeneous Treatment Effects in Panel Data.**

Retsef Levi, Elisabeth Paulson, Georgia Perakis, Emily Zhang. Minor Revision at *Manufacturing & Service Operations Management*.

- Accepted for presentation at 2025 MSOM Sustainable Operations SIG
- Accepted for presentation at 2025 Cornell Young Researchers Workshop
- Accepted to the NeurIPS 2025 MLxOR Workshop

3. **Reducing Food Waste through a Reservation Scheme.**

Retsef Levi, Georgia Perakis, Emily Zhang. Major Revision at *Management Science*.

4. **On the Broadcast Dimension of a Graph.**

Emily Zhang, *Australasian Journal of Combinatorics* **85**(3) (2023), 313–339.

5. **An Upper and Lower Bound for the Convergence Time of House-Hunting in *Temnothorax* Ant Colonies.**

Emily Zhang, Jiajia Zhao, and Nancy Lynch, *Journal of Computational Biology* **29**(4) (2022), 344–357.

6. **CDFShop: Exploring and Optimizing Learned Index Structures.**

Ryan Marcus, Emily Zhang, and Tim Kraska, *ACM SIGMOD* 2020.

## Working Papers

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1. **The Categorical Joint Replenishment Problem.**  
Retsef Levi, Georgia Perakis, Emily Zhang. Working paper.
2. **Optimizing Food Allocation in the Met Council Pantry Network.**  
Retsef Levi, Georgia Perakis, Emily Zhang. Working paper.

## Talks

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1. **Heterogeneous Treatment Effects in Panel Data**
  - 2025 Cornell Young Researchers Workshop
  - 2025 MSOM Sustainable Operations Management SIG Conference
  - 2025 Annual POMS Conference
  - 2024 INFORMS Annual Meeting
  - 2024 Manufacturing & Services Operation Management Conference
2. **Reducing Food Waste through a Reservation Scheme**
  - 2025 Data, Models, and Decisions for MIT Executive MBAs
  - 2023 INFORMS Annual Meeting
3. **An Upper and Lower Bound for the Convergence Time of House-Hunting in Temnothorax Ant Colonies**
  - 2021 8th workshop on Biological Distributed Algorithms
4. **On the Broadcast Dimension of a Graph**
  - 2020 AMS Virtual Sectional Meetings
5. **Optimization Algorithms Given by Discretizations of the Euler-Lagrange ODE**
  - 2019 MIT IEEE Undergraduate Research Technology Conference
  - 2019 Georgia Tech REU Poster Session
  - 2019 Young Mathematicians Conference at The Ohio State University

## Teaching Experience

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**Teaching Assistant** at MIT Sloan School of Management Spring 2025  
Data, Models, and Decisions (15.730)

- MIT Sloan Executive MBA core curriculum course with 120+ EMBA students
- Taught recitations, delivered plenary presentation on causal inference, held office hours, and graded cases. Student rating: 6.7/7.0

**Teaching Assistant** at MIT Sloan School of Management Summer 2024  
Introduction to Operations Management (15.734)

- MIT Sloan Executive MBA core curriculum course with 120+ EMBA students
- Taught recitations, ran online competitive simulation game, held office hours, and grade cases. Student rating: 6.7/7.0

**Instructor** at MIT Operations Research Center  
Computing in Optimization and Statistics (15.S60)

Winter 2024

- Taught a 3-hour data analytics session using R for first-year doctoral students.

**Grader** at MIT Department of Mathematics  
Probability and Random Variables (18.600)

Spring 2020

**Laboratory Assistant** at MIT Department of EECS  
Introduction to Machine Learning (6.036)

Fall 2019

## Research Experience

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**MIT Operations Research Center (ORC)**

Cambridge, MA

*Doctoral Research Assistant*

Sept 2021 – Present

- Developing new analytical methods aimed at reducing food waste and optimizing food subsidy programs.

**MIT Computer Science & Artificial Intelligence Laboratory (CSAIL)**

Cambridge, MA

*Undergraduate Researcher in the Theory of Distributed Systems Group*

Aug 2020 – Aug 2021

- Analyzed the house-hunting process in ant colonies from a distributed computing perspective to inspire swarm robotics research.
- Proved theoretical guarantees on the consensus time of an agent-based model for house-hunting.

**Duluth Research Experience for Undergraduates (REU)**

Duluth, MN

*Undergraduate Researcher*

Summer 2020

- Conducted research in graph theory.
- Derived an asymptotically optimal lower bound on the broadcast dimension of acyclic graphs.

**MIT Computer Science & Artificial Intelligence Laboratory (CSAIL)**

Cambridge, MA

*Undergraduate Researcher*

Sept 2019 – Dec 2019

- Explored the potential of the recursive model index (RMI), a learned index structure tuned to a user's data by machine learning, to outperform traditional index structures in the task of searching over sorted data.
- Built an RMI optimizer on top of the existing RMI codebase.

**Georgia Tech Mathematics REU**

Atlanta, GA

*Undergraduate Researcher*

Summer 2019

- Researched accelerated gradient-based convex optimization algorithms, based on discretizing continuous-time curves converging to the optimum.

**MIT Media Lab**

Cambridge, MA

*Undergraduate Researcher in the Molecular Machines Group*

Jan 2019 – Feb 2019

- Parsed the scientific citation network to extract features that indicate early signs of highly-impactful ideas.
- Created visualizations to understand how infectious ideas are spread across communities.

**MIT Media Lab**

Cambridge, MA

*Undergraduate Researcher in the Personal Robots Group*

Summer 2018

- Designed and developed literacy games using Unity and C#.

- Implemented a data tracking system that tracks children’s learning performance and interaction history with a social robot and the literacy games.

### Summer Science Program

Socorro, New Mexico

*Student Researcher working on Asteroid Orbit Determination*

Summer 2016

- Observed the near-earth asteroid 1999 ML with the C-14 telescope at Etsorn Observatory and determined its orbit.

## Professional Service

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### INFORMS Optimization Society Conference (IOS 2026)

Atlanta, GA

*Session Chair*

Spring 2026

### MIT ORC Seminar Series

Cambridge, MA

*Coordinator*

Fall 2024

### MIT ORC Independent Activities Period (IAP) Seminar

Cambridge, MA

*Coordinator*

IAP 2024

### MIT Undergraduate Society of Women in Mathematics (USWIM)

Cambridge, MA

*Publicity Chair*

2019 – 2021

### MIT Society of Women Engineers (SWE)

Cambridge, MA

*Board Member & Technology Chair*

2019 – 2020

## Scholarships and Awards

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Accepted for presentation at MSOM Sustainable Operations SIG

2025

NSF Graduate Fellowship

2021

Ida M. Green Fellowship

2021–2022

## Additional Information

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**Languages:** English (native), Mandarin Chinese (fluent), French (conversational), Spanish (basic)

**Technical skills:** Python, R, Java, Julia, SQL, JuMP, Gurobi, LaTeX