

# 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  
Data, Models, and Decisions (15.730)

Spring 2025

- 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  
Introduction to Operations Management (15.734)

Summer 2024

- 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

<b>Instructor</b> at MIT Operations Research Center Computing in Optimization and Statistics (15.S60)	Winter 2024
<b>Grader</b> at MIT Department of Mathematics Probability and Random Variables (18.600)	Spring 2020
<b>Laboratory Assistant</b> at MIT Department of EECS Introduction to Machine Learning (6.036)	Fall 2019

## Research Experience

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<b>MIT Operations Research Center (ORC)</b> <i>Doctoral Research Assistant</i>	Cambridge, MA Sept 2021 – Present
<ul style="list-style-type: none"> <li>Developing new analytical methods aimed at reducing food waste and optimizing food subsidy programs.</li> </ul>	
<b>MIT Computer Science &amp; Artificial Intelligence Laboratory (CSAIL)</b> <i>Undergraduate Researcher in the Theory of Distributed Systems Group</i>	Cambridge, MA Aug 2020 – Aug 2021
<ul style="list-style-type: none"> <li>Analyzed the house-hunting process in ant colonies from a distributed computing perspective to inspire swarm robotics research.</li> <li>Proved theoretical guarantees on the consensus time of an agent-based model for house-hunting.</li> </ul>	
<b>Duluth Research Experience for Undergraduates (REU)</b> <i>Undergraduate Researcher</i>	Duluth, MN Summer 2020
<ul style="list-style-type: none"> <li>Conducted research in graph theory.</li> <li>Derived an asymptotically optimal lower bound on the broadcast dimension of acyclic graphs.</li> </ul>	
<b>MIT Computer Science &amp; Artificial Intelligence Laboratory (CSAIL)</b> <i>Undergraduate Researcher</i>	Cambridge, MA Sept 2019 – Dec 2019
<ul style="list-style-type: none"> <li>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.</li> <li>Built an RMI optimizer on top of the existing RMI codebase.</li> </ul>	
<b>Georgia Tech Mathematics REU</b> <i>Undergraduate Researcher</i>	Atlanta, GA Summer 2019
<ul style="list-style-type: none"> <li>Researched accelerated gradient-based convex optimization algorithms, based on discretizing continuous-time curves converging to the optimum.</li> </ul>	
<b>MIT Media Lab</b> <i>Undergraduate Researcher in the Molecular Machines Group</i>	Cambridge, MA Jan 2019 – Feb 2019
<ul style="list-style-type: none"> <li>Parsed the scientific citation network to extract features that indicate early signs of highly-impactful ideas.</li> <li>Created visualizations to understand how infectious ideas are spread across communities.</li> </ul>	
<b>MIT Media Lab</b> <i>Undergraduate Researcher in the Personal Robots Group</i>	Cambridge, MA Summer 2018
<ul style="list-style-type: none"> <li>Designed and developed literacy games using Unity and C#.</li> </ul>	

- 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**

*Student Researcher working on Asteroid Orbit Determination*

Socorro, New Mexico

Summer 2016

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

## **Professional Service**

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### **INFORMS Optimization Society Conference (IOS 2026)**

*Session Chair*

Atlanta, GA

Spring 2026

### **MIT ORC Seminar Series**

*Coordinator*

Cambridge, MA

Fall 2024

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

*Coordinator*

Cambridge, MA

IAP 2024

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

*Publicity Chair*

Cambridge, MA

2019 – 2021

### **MIT Society of Women Engineers (SWE)**

*Board Member & Technology Chair*

Cambridge, MA

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