

# CHARLOTTE PARK

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## RESEARCH INTERESTS

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Causal Inference, Statistics, ML Theory, Algorithms, Theoretical Computer Science

## EDUCATION

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**Massachusetts Institute of Technology**, Ph.D. in Computer Science August 2022 - May 2027  
Advised by Prof. Devavrat Shah

**California Institute of Technology**, B.S. in Computer Science October 2018 - June 2022  
GPA: 4.1/4.3

**The University of Edinburgh**, Exchange Student Fall 2020  
School of Informatics

## PUBLICATIONS

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1. Sean Mann\*, **Charlotte Park\***, Devavrat Shah, Exploiting Observation Bias to Improve Matrix Completion  
*In submission* (2023)

## APPLICABLE SKILLS

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**Languages** Python, Java, C, OCaml, MATLAB, Mathematica, Javascript  
**Libraries and Frameworks** Pytorch, Keras/Tensorflow, Opencilk, Git, Jupyter, Docker

## RESEARCH EXPERIENCE

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**Massachusetts Institute of Technology** August 2022 - Present  
Graduate Researcher (PhD Student) *Cambridge, MA*  
*Advised by Prof. Devavrat Shah*

- Working with historical data from an e-commerce platform to build a sequential simulator to model user behavior.
- Exploiting low-rank structure of data to evaluate various policy decisions in a data-efficient manner.
- Developing an algorithm to determine ideal policy by optimizing over a class of policies based on outcomes of interest.
- Validating theoretical results promised by algorithm with data.
- Using interaction data to derive a personalized model for each individual and then optimizing over all models to find desired recommendation system.

**California Institute of Technology** October 2021 - June 2022  
Undergraduate Researcher *Pasadena, CA*  
*Advised by Prof. Leonard Schulman*

- Worked on causal inference and causal identification algorithms in the DAG framework.
- Presented final work as senior thesis counting towards B.S. in Computer Science.
- Provided formal proof of the 3 rules of Do-Calculus, resulting in a document presented at the Causality Bootcamp workshop hosted by the Simons Institute.
- Rigorously proved hedge criterion in proof of correctness for the Sipser/Pearl causal identification algorithm.

**Massachusetts Institute of Technology** June 2021 - August 2021  
Visiting Undergraduate Researcher *Cambridge, MA*  
*Advised by Prof. Charles E. Leiserson*

- Optimized ray tracing engine in C while generating reproducible results.
- Parallelized code using OpenCilk and obtained profiling results on machines with up to 8 cores.
- Performed work-span analysis to analyze potential for parallelism. Optimized both serial and parallel code to obtain runtimes up to 75 times as fast as original code.

## Massachusetts Institute of Technology

Visiting Undergraduate Researcher

*Advised by Prof. Charles E. Leiserson*

June 2020 - August 2020

*Cambridge, MA*

- Worked on optimization of child filtering in spatial partition trees using uncompressed and compressed tries.
- Examined various algorithmic techniques for constructing theoretically optimal tries.
- Developed and implemented heuristic algorithm for reordering trie codes in C.

## PROFESSIONAL EXPERIENCE

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### Akamai Technologies

Software Engineering Intern

June 2019 - September 2019

*Cambridge, MA*

- Developed Java-based server for generating blame file detailing revision history of customer metadata.
- Integrated Git's blame feature in project to improve upon existing diff tool within Property Manager service available directly to customers.
- Attended daily Scrum Team meetings which provided a collaborative environment to discuss ideas and allow for a greater understanding of other projects within the company.

## TEACHING EXPERIENCE

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### Algorithms (CS 38)

Head Teaching Assistant

March 2022 - June 2022

- Instructor: Peter Schröder

### Machine Learning and Data Mining (CS/CNS/EE 155)

Teaching Assistant, Graduate Level

January 2022 - March 2022

- Instructor: Yisong Yue

### Algorithms (CS 38)

Teaching Assistant

March 2021 - June 2021

- Instructor: Peter Schröder

### Introduction to Programming Methods (CS 2)

Teaching Assistant

January 2021 - March 2021

- Instructor: Adam Blank

## HONORS AND AWARDS

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- Siebel Scholar (2024)
- MIT Presidential Fellow (2022)
- School of Engineering Exemplary Scholar, MIT (2022)

## PROJECTS

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### Projection of COVID-19 Cases

- Developed model to project COVID-19 case rates given changes in policy.
- Trained LGBM model with state- and county-level data.

- Model could predict case rates n weeks in the future for arbitrary county and state datasets.

## OUTREACH AND LEADERSHIP

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### **LIDS DEI Committee**

May 2023 - Present

*Student Representative*

- Student representative on committee aiming to assess the state of community, climate, and diversity at MIT LIDS (Laboratory for Information and Decision Systems).
- Working to understand, identify, and recommend ways of improving inclusion and belonging at LIDS.

### **MSRP (MIT Summer Research Program)**

January 2023

*Application Reader*

- Read applications and help select next cohort of MSRP participants, a summer program which offers research opportunities to students from underrepresented groups.

### **GAAP (Graduate Application Assistance Program)**

September 2022 - Present

*Mentor*

- Mentor students applying to PhD programs in EECS from underrepresented backgrounds.

### **Ruddock House Executive Committee**

February 2020 - February 2022

*Social Manager*

- Plan social events, manage events budget, and maintain social media for Ruddock House, one of the eight undergraduate houses at Caltech.