

Zachary I. Schutzman

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INTERESTS Algorithmic game theory and economics, fairness in algorithm design, differential privacy and its applications, computational social science, theoretical machine learning, mathematics of redistricting

APPOINTMENTS **Massachusetts Institute of Technology**, Cambridge, MA
Institute for Data, Systems, and Society 2021 –
Michael Hammer Postdoctoral Fellow
Schwartzman College of Computing 2021 –
Social and Ethical Responsibilities of Computing Postdoctoral Scholar

EDUCATION **University of Pennsylvania** Philadelphia, PA 2016 – 2021
Ph.D., Computer and Information Science
Thesis: *Algorithmic Processes and Social Values*
Advisor: Aaron Roth
Affiliations: Warren Center for Data & Network Science, Penn Research in Machine Learning, CS Theory Research Group

Colby College Waterville, ME 2012 – 2016
B.A., *cum laude*, Economics (Honors) and Mathematics
Thesis: *Computational Simulation and Analysis of Landscape Conservation Auctions*
Advisors: Timothy Hubbard and Sahan Dissanayake
Phi Beta Kappa, William D. Adams Presidential Scholar, Distinction in Economics
Minor: Computer Science

RESEARCH Authors are listed alphabetically by surname

Algorithmic Redistricting and Black Representation in US Elections
In *MIT Case Studies in Social and Ethical Responsibilities of Computing*, Winter 2022

Algorithms and Learning for Fair Portfolio Design
In *Proceedings of the ACM Conference on Economics and Computation (EC)*, 2021
with Emily Diana, Travis Dick, Hadi Elzayn, Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi, and Juba Ziani

Geometry of Graph Partitions via Optimal Transport
In *SIAM Journal on Scientific Computing*, Vol. 42 Issue 5. Oct. 2020
with Tara Abrishami, Nestor Guillen, Parker Rule, Justin Solomon, Thomas Weighill, and Si Wu

The Gerrymandering Jumble: Map Projections Permute Districts' Compactness Scores

In *Cartography and Geographic Information Science*, Vol. 3 Issue 46. May 2020
with Assaf Bar-Natan and Lorenzo Najt

Trade-Offs in Fair Redistricting

In *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society (AIES)*, 2020
accepted with an oral presentation

Total Variation Isoperimetric Profiles

In *SIAM Journal on Applied Algebra and Geometry*, Vol. 3 Issue 4. Nov. 2020
with Daryl DeFord, Hugo Lavenant, and Justin Solomon

Equilibrium Characterization for Data Acquisition Games

In *Proceedings of the 28th International Joint Conferences on Artificial Intelligence (IJCAI)*, 2019
with Jinshuo Dong, Hadi Elzayn, Shahin Jabbari, and Michael Kearns

The Price of Privacy in the Keynesian Beauty Contest

In *Proceedings of the ACM Conference on Economics and Computation (EC)*, 2019
with Hadi Elzayn

Fair Algorithms for Learning in Allocation Problems

In *Proceedings of the ACM Conference on Fairness, Accountability, and Transparency (FAT*)*, 2019
with Hadi Elzayn, Shahin Jabbari, Michael Kearns, Christopher Jung, Seth Neel, and Aaron Roth

Strategic Classification from Revealed Preferences

In *Proceedings of the ACM Conference on Economics and Computation (EC)*, 2018
with Jinshuo Dong, Aaron Roth, Bo Waggoner, and Zhiwei Steven Wu
appeared at the Workshop on Learning in the Presence of Strategic Behavior (NeurIPS 2017)
as a long oral presentation

**OTHER
PROJECTS &
WRITING**

Expert Declaration in *Benninghoff v 2021 Legislative Reapportionment Commission*, Supreme Court of Pennsylvania Submitted an expert declaration in support of *amici curiae* NAACP, *et al.*, supporting the arguments that the LRC appropriately counted certain incarcerated people at their last known address rather than the location of their cell for the purposes of redistricting and that the proposed State House plan did not unfairly disadvantage Republican incumbents.
Brief with attached Declaration available at the Pennsylvania Courts' website

Diffix Bug Bounty Program Winner

Executed three linear programming reconstruction attack on a supposedly privacy-preserving data analysis product, with Travis Dick and Matthew Joseph.
Coauthored a pair of blog posts on differentialprivacy.org with Aloni Cohen, Sasho Nikolov, and Jon Ullman
Available at <https://differentialprivacy.org/reconstruction-theory/>,
<https://differentialprivacy.org/diffix-attack/>

GerryChain, Contributor

An open-source Python Markov Chain Monte Carlo sampler to generate ensembles of redistricting plans.
Available at <https://github.com/mggg/GerryChain>

District-Shortening Flow

An introduction to 'multiscale compactness' using curve-shortening flow.
Available at <https://mggg.org/distflow>

Redistricting Gridlandia

An gentle interactive introduction to the mathematics of redistricting.
Appeared in *Geometry v. Gerrymandering*, Moon Duchin *Scientific American*, Nov. 2018
Available at <https://mggg.org/metagraph>

**ASSISTANT-
SHIPS**

Graduate Research Fellow Voting Rights Data Institute, MIT/Tufts Summer 2018
Worked on problems at the interface of mathematics, computing, and statistics with redistricting and voting rights with expert practitioners, faculty, and students from a range of disciplines.
Hosts: Moon Duchin (Tufts Mathematics) & Justin Solomon (MIT CSAIL)

**TEACHING &
MENTORSHIP**

Voting Rights Data Institute Faculty, MIT/Tufts Summer 2019
Co-led independent research groups of undergraduate and graduate students from various disciplinary backgrounds on topics at the intersection of mathematics, computing, and voting rights. Organized and co-taught a series of hands-on workshops introducing students to topics and techniques in optimization.

Independent Study

Michael Ramdatt, *Quadratic Voting Analysis* (with Bo Waggoner) Spring 2018

Teaching Assistantships

Algorithmic Game Theory (NETS 412), UPenn Spring 2018
Networked Life (NETS 112), UPenn Fall 2017
Game Theory (EC 379), Colby College Spring 2016
Data Structures and Algorithms (CS 231), Colby College Fall 2015
Computational Thinking (CS 151/152), Colby College 2014-2015

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| TALKS | Algorithmic Redistricting and Black Representation | May 2021 |
| | MIT Workshop on Systemic Racism and Computation | |
| | Algorithms for Applied Large-Scale Differential Privacy | October 2020 |
| | Written Preliminary Exam Presentation | |
| | Algorithms, Fairness, and Redistricting | April 2020 |
| | Penn CIS Student Colloquium | |
| | Trade-Offs in Fair Redistricting | February 2020 |
| | AIES | |
| | Equilibrium Characterization for Data Acquisition Games | August 2019 |
| | IJCAI | |
| SERVICE | Introduction to the Metagraph of Districting Plans | June 2019 |
| | Voting Rights Data Institute | |
| | Graphs, Geometry, and Gerrymanders | February 2019 |
| | University of Toronto Dept. of Mathematics <i>Diet Graduate Seminar</i> | |
| | Shape Analysis for Redistricting | February 2019 |
| | University of Toronto Dept. of Mathematics <i>Hyperbolic Lunch Seminar</i> | |
| | Computational Simulation and Analysis for Landscape Auctions | May 2016 |
| | Honors Thesis Defense, Colby College Department of Economics | |
| | Reviewing | |
| | NeurIPS Workshop on Machine Learning for Economic Policy 2020 (PC), AAAI 2020 (PC), ICML 2019, EC 2018 | |
| U. of Pennsylvania Computer and Information Science Department | | |
| Dean's Doctoral Advisory Board, Summer 2020 COVID-19 Communications Committee, Volunteer for applicant support program for prospective students from groups underrepresented in computing, Student representative on CIS doctoral requirements committee | | |
| TECHNICAL SKILLS | Python, C++, Julia, | |
| | MATLAB, QGIS, Isadora, | |