

Ellen Vitercik

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Employment

2022-	Assistant Professor <i>Management Science and Engineering Computer Science</i>	Stanford University
2021-2022	Miller Fellow <i>Hosts: Jennifer Chayes and Michael Jordan</i>	University of California, Berkeley

Education

2021	PhD in Computer Science <i>Advisors: Maria-Florina Balcan and Tuomas Sandholm Thesis committee: Eric Horvitz, Kevin Leyton-Brown, and Ameet Talwalkar</i>	Carnegie Mellon University
2018	MS in Computer Science	Carnegie Mellon University
2015	BA in Mathematics, <i>summa cum laude</i>	Columbia University

Honors and awards

2024	AI2050 Early Career Fellowship <i>Schmidt Sciences</i>	
2024	National Science Foundation CAREER Award	
2023	Exemplary Artificial Intelligence Track Paper Award <i>Awarded to one paper at the ACM Conference on Economics and Computation (EC)</i>	
2022-2025	Gabilan Fellowship <i>Stanford University</i>	
2022	Robert N. Noyce Faculty Fellow <i>Stanford University</i>	
2022	Simons-Berkeley Research Fellowship (declined)	
2021-2022	Miller Fellowship <i>University of California, Berkeley</i>	
2021	ACM SIGecom Dissertation Award <i>ACM Special Interest Group on Economics and Computation</i>	
2021	Distinguished Dissertation Award <i>Carnegie Mellon University, School of Computer Science</i>	

2021	Victor Lesser Distinguished Dissertation—Honorable Mention <i>International Foundation for Autonomous Agents and Multiagent Systems</i>
2019	Best Presentation by a Student or Postdoctoral Researcher <i>ACM Conference on Economics and Computation (EC)</i>
2019	Early Career Invited Lecture Award <i>UBC Science</i>
2019-2021	IBM PhD Fellowship
2019-2020	Fellowship in Digital Health <i>Carnegie Mellon University's Center for Machine Learning and Health</i>
2019	Exemplary Artificial Intelligence Track Paper Award <i>Awarded to one paper at the ACM Conference on Economics and Computation (EC)</i>
2017	Teaching Assistant of the Year Award <i>Carnegie Mellon University's Machine Learning Department</i>
2016-2019	National Science Foundation Graduate Research Fellowship
2016-2017	Microsoft Research Women's Fellowship
2015-2021	National Physical Science Consortium Fellowship (declined)
2015-2017	Kellett Fellowship (declined) <i>Full scholarship for postgraduate study at Oxford</i>
2014	Phi Beta Kappa Junior Inductee <i>Awarded to the top 2% of the graduating Columbia College class</i>
2012	Columbia University Class of 1956 Scholarship

Publications

JOURNAL PAPERS

2024	Maria-Florina Balcan, Dan DeBlasio, Travis Dick, Carl Kingsford, Tuomas Sandholm, and Ellen Vitercik. How much data is sufficient to learn high-performing algorithms? <i>Journal of the ACM (JACM)</i> . Supersedes the STOC'21 paper below.
2024	Maria-Florina Balcan, Travis Dick, Tuomas Sandholm, and Ellen Vitercik. Learning to branch: Generalization guarantees and limits of data-independent discretization. <i>Journal of the ACM (JACM)</i> . Supersedes the ICML'20 and ICML'18 papers below.
2024	Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik. Generalization guarantees for multi-item profit maximization: Pricing, auctions, and randomized mechanisms. <i>Operations Research (OR)</i> . Supersedes the EC'18 paper below.

CONFERENCE PAPERS

- 2024 Joon Suk Huh, Ellen Vitercik, and Kirthevasan Kandasamy.
Bandit profit-maximization for targeted marketing.
ACM Conference on Economics and Computation (EC).
- 2024 Alexandre Hayderi, Amin Saberi, Ellen Vitercik, and Anders Wikum.
MAGNOLIA: Matching algorithms via GNNs for online value-to-go approximation.
International Conference on Machine Learning (ICML).
- 2023 Wenshuo Guo, Nika Haghtalab, Kirthevasan Kandasamy, and Ellen Vitercik.
Leveraging reviews: Learning to price with buyer and seller uncertainty.
ACM Conference on Economics and Computation (EC).
Exemplary Artificial Intelligence Track Paper Award (awarded to one paper at EC 2023).
- 2023 Christian Borgs, Jennifer Chayes, Christian Ikeokwu, and Ellen Vitercik.
Disincentivizing polarization in social networks.
ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO).
- 2022 Maria-Florina Balcan, Siddharth Prasad, Tuomas Sandholm, and Ellen Vitercik.
Structural analysis of branch-and-cut and the learnability of Gomory mixed integer cuts.
Conference on Neural Information Processing Systems (NeurIPS).
- 2022 Wenshuo Guo, Michael I. Jordan, and Ellen Vitercik.
No-regret learning in partially-informed auctions.
International Conference on Machine Learning (ICML).
- 2022 Maria-Florina Balcan, Siddharth Prasad, Tuomas Sandholm, and Ellen Vitercik.
Improved sample complexity bounds for branch-and-cut.
International Conference on Principles and Practice of Constraint Programming (CP).
- 2021 Maria-Florina Balcan, Siddharth Prasad, Tuomas Sandholm, and Ellen Vitercik.
Sample complexity of tree search configuration: Cutting planes and beyond.
Conference on Neural Information Processing Systems (NeurIPS).
- 2021 Ellen Vitercik and Tom Yan.
Revenue maximization via machine learning with noisy data.
Conference on Neural Information Processing Systems (NeurIPS).
- 2021 Maria-Florina Balcan, Dan DeBlasio, Travis Dick, Carl Kingsford, Tuomas Sandholm, and Ellen Vitercik.
How much data is sufficient to learn high-performing algorithms? Generalization guarantees for data-driven algorithm design.
ACM Symposium on Theory of Computing (STOC).
- 2021 Andrés Muñoz Medina, Umar Syed, Sergei Vassilvitskii, and Ellen Vitercik.
Private optimization without constraint violations.
International Conference on Artificial Intelligence and Statistics (AISTATS).
- 2021 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
Generalization in portfolio-based algorithm selection.
AAAI Conference on Artificial Intelligence.

- 2020 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
Refined bounds for algorithm configuration: The knife-edge of dual class approximability.
International Conference on Machine Learning (ICML).
- 2020 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
Learning to optimize computational resources: Frugal training with generalization guarantees.
AAAI Conference on Artificial Intelligence.
- 2019 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
Estimating approximate incentive compatibility.
ACM Conference on Economics and Computation (EC).
Exemplary Artificial Intelligence Track Paper Award (awarded to one paper at EC 2019).
Best Presentation by a Student or Postdoctoral Researcher (EC 2019).
Invited to the ACM Transactions on Economics and Computation (TEAC) Special Issue for EC 2019.
- 2019 Daniel Alabi, Adam Kalai, Katrina Ligett, Cameron Musco, Christos Tzamos, and Ellen Vitercik.
Learning to prune: Speeding up repeated computations.
Conference on Learning Theory (COLT).
- 2019 Christian Borgs, Jennifer Chayes, Nika Haghtalab, Adam Kalai, and Ellen Vitercik.
Algorithmic greenlining: An approach to increase diversity.
AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES).
- 2018 Maria-Florina Balcan, Travis Dick, and Ellen Vitercik.
Dispersion for data-driven algorithm design, online learning, and private optimization.
IEEE Symposium on Foundations of Computer Science (FOCS).
- 2018 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
A general theory of sample complexity for multi-item profit maximization.
ACM Conference on Economics and Computation (EC).
- 2018 Maria-Florina Balcan, Travis Dick, Tuomas Sandholm, and Ellen Vitercik.
Learning to branch.
International Conference on Machine Learning (ICML).
- 2018 Bernhard Haeupler, Amirbehshad Shahrashbi, and Ellen Vitercik.
Synchronization strings: Channel simulations and interactive coding for insertions and deletions.
International Colloquium on Automata, Languages and Programming (ICALP).
- 2017 Maria-Florina Balcan, Vaishnavh Nagarajan, Ellen Vitercik, and Colin White.
Learning-theoretic foundations of algorithm configuration for combinatorial partitioning problems.
Conference on Learning Theory (COLT).
- 2016 Maria-Florina Balcan, Tuomas Sandholm, and Ellen Vitercik.
Sample complexity of automated mechanism design.
Conference on Neural Information Processing Systems (NeurIPS).
- 2016 Maria-Florina Balcan, Ellen Vitercik, and Colin White.
Learning combinatorial functions from pairwise comparisons.
Conference on Learning Theory (COLT).

Tutorials

- 2024 **Machine Learning for Discrete Optimization: Theoretical Guarantees and Applied Frontiers**
AAAI Conference on Artificial Intelligence
- 2023 **Machine Learning for Algorithm Design: Theoretical Guarantees and Applied Frontiers**
Cargese-Porquerolles Workshop on Combinatorial Optimization
- 2021 **New Frontiers of Automated Mechanism Design for Pricing and Auctions**
AAAI Conference on Artificial Intelligence
with Maria-Florina Balcan and Tuomas Sandholm
- 2020 **AAAI Conference on Artificial Intelligence**
with Tuomas Sandholm
- 2019 **ACM Symposium on Theory of Computing (STOC)**
with Maria-Florina Balcan and Tuomas Sandholm
- 2019 **Conference on Economics and Computation (EC)**
with Maria-Florina Balcan and Tuomas Sandholm
- 2019 **AAAI Conference on Artificial Intelligence**
with Maria-Florina Balcan and Tuomas Sandholm
- 2018 **International Conference on Machine Learning (ICML)**
with Maria-Florina Balcan and Tuomas Sandholm under the title Machine Learning in Automated Mechanism Design for Pricing and Auctions

Workshop organization

- 2024 **New Directions in Machine Learning Theory**
Banff International Research Station
with Shai Ben-David and Amin Karbasi
- 2023 **Sampling and Optimization in Discrete Space**
International Conference on Machine Learning (ICML)
with Hanjun Dai, Priyank Jaini, Haoran Sun, and Ruqi Zhang

Selected talks

- 2024 **Online Matching with Graph Neural Networks**
Banff International Research Station, New Directions in Machine Learning Theory Workshop
- 2024 **YinzOR Conference**
- 2024 **Toyota Technological Institute at Chicago, Workshop on Learning-Augmented Algorithms**
- 2024 **Summer Workshop on Innovations in Management Science (SWIMS)**
- 2024 **From Large to Small Datasets: Size Generalization for Clustering Algorithm Selection**
International Symposium on Mathematical Programming
- 2024 **Massachusetts Institute of Technology, Theory of Computing Colloquium**
- 2024 **Oregon State University, AI Seminar**
- 2024 **Stanford University, Information Systems Laboratory Colloquium**
- 2024 **AAAI Workshop on Artificial Intelligence for Operations Research**
- 2024 **Leveraging Reviews: Learning to Price with Buyer and Seller Uncertainty**
Simons Institute, Data-Driven Decision Processes Reunion
- 2023 **Stanford University, Statistics Seminar**
- 2023 **University of Wisconsin-Madison, Systems, Information, Learning and Optimization Seminar**
- 2023 **INFORMS Annual Meeting**

2023 University of Chicago, Booth School of Business, Operations Workshop Series
 2023 Stanford Graduate School of Business, Operations, Information & Technology Seminar
 2023 University of Massachusetts, Amherst, CS Theory Seminar
 2023 Cornell Tech, Urban Tech Workshop
 2023 IPAM Workshop on Artificial Intelligence and Discrete Optimization

Machine Learning for Algorithm Design

2023 Stanford University, CS & EE New Research Directions Workshop
 2022 Simons Institute, Data-Driven Decision Processes Boot Camp

How Much Data is Sufficient to Learn High-Performing Algorithms?

2022 University of Massachusetts, Amherst, Algorithms with Predictions Seminar
 2021 Worcester Polytechnic Institute, Computer Science Colloquium
 2021 Purdue University, Theory Seminar
 2021 Stanford University, Statistics Seminar
 2021 Machine Learning for Algorithms Workshop, Foundation of Data Science Institute
 2021 ACM Symposium on Theory of Computing (STOC)
 2021 IPAM Workshop on Deep Learning and Combinatorial Optimization
 2020 NeurIPS Workshop on Learning Meets Combinatorial Algorithms
 2020 Stanford University, CS Theory Lunch
 2020 Columbia University, Theory Seminar

Generalization Guarantees For Multi-item Profit Maximization: Pricing, Auctions, And Randomized Mechanisms

2022 Google, Mountain View, Search-Ads Auction Spotlight Series
 2021 INFORMS Annual Meeting

Theoretical Foundations of Machine Learning for Cutting Plane Selection

2022 Stanford University, Women's Theory Forum

Machine Learning for Tree Search Configuration: Cutting Planes and Beyond

2022 Simons Foundation Symposium on New Directions in Theoretical Machine Learning

Automated Algorithm and Mechanism Configuration

2022 Conference on Economics and Computation (EC)

Estimating Approximate Incentive Compatibility

2022 Algorithmic Game Theory: Past, Present, and Future (Workshop for Noam Nisan's 60th Birthday)
 2020 Young Researcher Workshop on Economics and Computation, Tel-Aviv University
 2019 INFORMS Annual Meeting
 2019 Carnegie Mellon University, Theory Lunch
 2019 Conference on Economics and Computation (EC)
 2019 EC Workshop on Machine Learning in the Presence of Strategic Behavior

Sample Complexity of Tree Search Configuration: Cutting Planes and Beyond

2022 AAAI Workshop on Machine Learning for Operations Research
 2022 STOC Workshop on Algorithms with Predictions

Private Optimization Without Constraint Violations

2022 Workshop on Algorithms for Learning and Economics (WALE)
 2021 International Conference on Artificial Intelligence and Statistics (AISTATS)

Data-Driven Auction Design

2022 Miller Institute, UC Berkeley

2021	Theoretical Foundations of Data-Driven Algorithm Design Google Learning Theory Workshop
2021	Automated Parameter Optimization for Integer Programming AutoML Workshop at the International Conference on Machine Learning
2021	Integrating Machine Learning into Algorithm Design University of Texas at Austin, Computer Science Seminar
2021	New York University, Computer Science Colloquium
2021	Columbia University, Computer Science Colloquium
2021	University of British Columbia, Computer Science Seminar
2021	University of Waterloo, Computer Science Seminar
2021	Harvard University, Computer Science Colloquium
2021	Princeton University, Computer Science Department Colloquium
2021	University of California, Los Angeles, Computer Science Seminar
2021	California Institute of Technology, Frontiers in Computing and Mathematical Sciences Symposium
2021	MIT Sloan, Operations Research and Statistics Seminar
2021	Stanford University, Management Sciences and Engineering Seminar
2021	Georgia Institute of Technology, School of Computer Science Seminar
2021	Microsoft Research New England, Seminar
2020	Columbia University, Industrial Engineering and Operations Research Seminar
2021	Generalization in Portfolio-Based Algorithm Selection AAAI Conference on Artificial Intelligence
2020	Refined Bounds for Algorithm Configuration: The Knife-Edge of Dual Class Approximability INFORMS Annual Meeting
2020	International Conference on Machine Learning
2020	Machine Learning as a Tool for Algorithm Design Carnegie Mellon University, Open House for Admitted PhD Students
2019	University of British Columbia, Early Career Invited Lecture
2020	Learning to Prune: Speeding up Repeated Computations Carnegie Mellon University, Open House for Admitted PhD Students
2019	Conference on Learning Theory (COLT)
2019	Learning to Branch Cornell ORIE Young Researchers Workshop
2018	Carnegie Mellon University
2018	International Conference on Machine Learning (ICML)
2019	A General Theory of Sample Complexity for Multi-Item Profit Maximization EC ACM/INFORMS Workshop on Market Design
2018	INFORMS Annual Meeting
2018	China Theory Week
2018	AAMAS-IJCAI Workshop on Agents and Incentives in Artificial Intelligence
2018	Conference on Economics and Computation (EC)
2018	Dispersion for Data-Driven Algorithm Design, Online Learning, and Private Optimization Northwestern Quarterly Theory Workshop

Learning-Theoretic Foundations of Algorithm Configuration for Combinatorial Partitioning Problems

2018 INFORMS Annual Meeting

Sample Complexity of Multi-Item Profit Maximization

2017 Harvard University, Economics and CS Research Seminar

2017 Dagstuhl Workshop on *Game Theory Meets Computational Learning Theory*

2017 Workshop on Algorithmic Game Theory and Data Science at the Conference on Economics and Computation (EC)

Differentially Private Algorithm and Auction Configuration

2017 Carnegie Mellon University, Theory Lunch

Foundations of Application-Specific Algorithm Configuration

2017 Massachusetts Institute of Technology, Machine Learning Tea

2017 Microsoft Research New England, Machine Learning Lunch

2016 Carnegie Mellon University, Artificial Intelligence Lunch

Learning Submodular Functions from Pairwise Comparisons

2017 Carnegie Mellon University, Open House for Admitted PhD Students

2016 Conference on Learning Theory (COLT)

Sample Complexity of Automated Mechanism Design

2016 University of Pennsylvania, Theory Lunch

2016 Carnegie Mellon University, Theory Lunch

Teaching

Primary instructor

2022-2024 *Introduction to Probability*, Stanford MS&E 120

2024 *Machine Learning for Discrete Optimization*, Stanford MS&E 236 / CS 225

2023 *Machine Learning for Algorithm Design*, Stanford MS&E 331 / CS 331

Guest lecturer

2018 Machine Learning and Differential Privacy

Carnegie Mellon University course on Advanced Introduction to Machine Learning

2017 Introduction to Auction Design via Machine Learning

Carnegie Mellon University course on Advanced Introduction to Machine Learning

2017 Introduction to Research in Machine Learning

Carnegie Mellon University course on Research and Innovation in Computer Science

Research mentoring

Postdocs

2024- Connor Lawless (joint with Madeleine Udell)

PhD students

2024- Yu He

2024- Mika Jain (co-advised with Greg Valiant)

2024- Nikil Selvam (co-advised with Sanmi Koyejo)

2023- Yingxi Li

2023- Anders Wikum

2022- Ishani Karmarkar (co-advised with Aaron Sidford)

Masters students

2023-2024 Yash Dalmia (Stanford University)

2023-2024 Alexandre Hayderi (Stanford University)

Undergraduate students

2021-2023 Korinna Frangias (UC Berkeley)

2021-2023 Andrew Lin (UC Berkeley)

2021-2023 David Zhang (UC Berkeley)

2018-2019 Rong He (Carnegie Mellon University)

2017 Mengxiao Zhang (Peking University)

Outreach

2021- Co-founder of the Learning Theory Alliance
Mentorship initiative for the machine learning theory community.

2024 Co-chair of *Mentoring Chats* at the International Conference on Learning Representations (ICLR)

2022 Teaching Assistant at the Institute for Advanced Studies' *Women and Mathematics* program

2015-2020 Volunteer Instructor for Carnegie Mellon University TechNights
Workshop for middle school girls.
Sessions led: "Strategic Voting", "Game Theory", "Smashing Computers", and "Logic Puzzles".

2019 Session leader for Carnegie Mellon University OurCS
Workshop for undergraduate women in computer science.
Session led: "Machine Learning for Automated Algorithm Configuration".

2014-2015 Workshop Leader for Columbia University's Computer Science Emerging Scholars Program

Professional activities

Program committee chair

Learning on Graphs Conference (LoG) 2025

Senior program committee

Conference on Learning Theory (COLT) 2024

Area chair

International Conference on Machine Learning (ICML) 2024

Program committee

Conference on Economics and Computation (EC) 2023, 2025

Conference on Fairness, Accountability, and Transparency (FAccT) 2023

Conference on Web and Internet Economics (WINE) 2021

Innovations in Theoretical Computer Science (ITCS) 2023

International Conference on Algorithmic Learning Theory (ALT) 2022, 2023

Symposium on Discrete Algorithms (SODA) 2024

Journal editorial boards

2024- Associate Editor, INFORMS Journal on Computing

2024- Action Editor, Transactions on Machine Learning Research (TMLR)

Workshop chair

2024-2025 Conference on Economics and Computation (EC)

Awards committees

2024-2025 INFORMS George Nicholson Student Paper Competition

Journal reviewing

ACM Transactions on Economics and Computation (TEAC) 2020, 2021

Artificial Intelligence (AIJ) 2019, 2021

IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) 2019

INFORMS Journal on Computing 2019

INFORMS Journal on Optimization 2022

Journal of the ACM (JACM) 2020, 2021, 2023

Management Science 2022

Nature Advances 2023

Operations Research (OR) 2020, 2021

SIAM Journal on Mathematics of Data Science (SIMODS) 2019

Conference reviewing

AAAI Conference on Artificial Intelligence 2021

Conference on Artificial Intelligence, Ethics, and Society (AIES) 2019

Conference on Economics and Computation (EC) 2020

Conference on Learning Theory (COLT) 2018

Conference on Neural Information Processing Systems (NeurIPS) 2017, 2018, 2019, 2020, 2021

European Symposium on Algorithms (ESA) 2020

Innovations in Theoretical Computer Science (ITCS) 2021, 2022

International Colloquium on Automata, Languages and Programming (ICALP) 2022

International Conference on Artificial Intelligence and Statistics (AISTATS) 2019

International Conference on Learning Representations (ICLR) 2022, 2024

International Conference on Machine Learning (ICML) 2017, 2018, 2019, 2020

International Conference on Randomization and Computation (RANDOM) 2018

International Joint Conference on Artificial Intelligence (IJCAI) 2016

Symposium on Discrete Algorithms (SODA) 2018, 2020, 2021, 2023

Symposium on Foundations of Computer Science (FOCS) 2019

Symposium on Principles of Distributed Computing (PODC) 2016

Symposium on Theory of Computing (STOC) 2017, 2020, 2021, 2024

Conference on Web and Internet Economics (WINE) 2018

Session Chair

INFORMS Annual Meeting, 2018

University service

Stanford University

2022, 2024 PhD Admissions Committee Member, Computer Science Department

2023 Faculty Search Committee Member, Management Science & Engineering Department

Carnegie Mellon University

2017-2018 PhD Admissions Committee Member, Computer Science Department

2016-2017 Co-coordinator of the Artificial Intelligence Lunch and Seminar

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