Matthew Brennan

CONTACT INFORMATION
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RESEARCH INTERESTS
Average-case complexity and related topics, algorithms and machine learning, high-dimensional statistics, discrete probability

EDUCATION

Massachusetts Institute of Technology 2016–*present*
Candidate for Ph.D. in Electrical Engineering and Computer Science

Massachusetts Institute of Technology 2018
S.M. in Electrical Engineering and Computer Science
Thesis: Reducibility and computational lower bounds for problems with planted sparse structure, *Advisor:* Guy Bresler
Ernst A. Guillemin Award for Best Thesis in EE (1st prize)
GPA: 5.0/5.0

Massachusetts Institute of Technology 2016
B.Sc. Electrical Engineering and Computer Science
B.Sc. Mathematics
GPA: 5.0/5.0

PAPERS

Statistical query algorithms and low-degree tests are almost equivalent, M. Brennan, G. Bresler, S. Hopkins, J. Li, T. Schramm, Manuscript, 2020.

Reducibility and statistical-computational gaps from secret leakage, M. Brennan, G. Bresler, *Conference on Learning Theory (COLT)*, 2020.
Best Student Paper Award

Phase transitions for detecting latent geometry in random graphs, M. Brennan, G. Bresler, D. Nagaraj, to appear in *Probability Theory and Related Fields*, 2020.

The average-case complexity of counting cliques in Erdős-Rényi Hypergraphs, E. Boix-Adsera, M. Brennan, G. Bresler, *Foundations of Computer Science (FOCS)*, 2019.
Invited to the SIAM Journal on Computing Special Issue for FOCS 2019

Universality of computational lower bounds for submatrix detection, M. Brennan, G. Bresler, W. Huleihel, *Conference on Learning Theory (COLT)*, 2019.

Optimal average-case reductions to sparse PCA: from weak assumptions to strong hardness, M. Brennan, G. Bresler, *Conference on Learning Theory (COLT)*, 2019.

Reducibility and computational lower bounds for problems with planted sparse structure, M. Brennan, G. Bresler, W. Huleihel, *Conference on Learning Theory (COLT)*, 2018.
Best Student Paper Award

Ramsey numbers of trees versus odd cycles, M. Brennan, in *The Electronic Journal of Combinatorics*, 2016.

Ramsey numbers of trees and unicyclic graphs versus fans, M. Brennan, in *Discrete Mathematics*, 2017.

Efficient descriptor-based segmentation of parotid glands with non-local means, C. Wachinger, M. Brennan, G. Sharp and P. Golland, in *IEEE Transactions on Biomedical Engineering*, 2017.

On the importance of location and features for the patch-based segmentation of parotid glands, C. Wachinger, M. Brennan, G. Sharp and P. Golland, in *Proc. MICCAI Workshop on Image-Guided Adaptive Radiation Therapy*, 2014.

Awards

COLT Best Student Paper Award, 2020
First Prize, Ernst A. Guillemin Award for Best Master's Thesis in EE, 2018
COLT Best Student Paper Award, 2018
MIT Hewlett-Packard Graduate Student Fellowship, 2017
Phi Beta Kappa, 2016
20th Place, 2013 William Lowell Putnam Competition
Gold Medal, 2012 International Math Olympiad

Experience

Reviewer for COLT, FOCS, STOC, SODA, NeurIPs, RANDOM	2017−*present*
Software Engineering Intern, Google Ads Quality	Summer 2018
Leader, Canadian Program for the International Math Olympiad	2018−2019
Canadian Math Olympiad Committee	2014−*present*
REU in Combinatorics and Number Theory, UMN Duluth	Summer 2015
Undergraduate Researcher, Medical Vision Group, MIT CSAIL	2013−2015

Talks

Reducibility and statistical-computational gaps from secret leakage, *COLT 2020* and *Mathematics, Information and Computation Seminar*, NYU Courant Institute, 2020.

The average-case complexity of counting cliques in Erdős-Rényi Hypergraphs, *Stanford Theory Seminar*, 2019.

Universality of computational lower bounds for submatrix detection, *COLT 2019*, *INFORMS 2019* and *LIDS Student Conference 2020*.

Optimal average-case reductions to sparse PCA: from weak assumptions to strong hardness, *COLT 2019*.

Reducibility and computational lower bounds for problems with planted sparse structure, *COLT 2018* and *LIDS Student Conference 2019*.

Burr-goodness for odd cycles versus trees and fans versus trees and unicyclic graphs, *MIT Combinatorics Seminar*, February 2016.

Ramsey numbers of trees and unicyclic graphs versus odd cycles and fans, *JMM Session in Combinatorics and Graph Theory IV*, January 2016.