# Andrew D. McRae

EPFL
Institute of Mathematics

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admcrae.github.io


**Research Interests**

Exploiting structure in high-dimensional statistics and machine learning
(Non-)convex relaxation and optimization for high-dimensional inference

**Education**

**Ph.D. in Electrical and Computer Engineering** 2017–2022
Georgia Institute of Technology
Thesis: *Structured Statistical Estimation via Optimization*
Advisor: Mark Davenport

**M.S. in Mathematics** 2021
Georgia Institute of Technology

**M.S. in Electrical and Computer Engineering** 2016
Georgia Institute of Technology

**B.S. in Applied Mathematics** 2012–2015
**B.S. in Electrical Engineering**
Georgia Institute of Technology
Highest Honor

**Employment**

**École polytechnique fédérale de Lausanne (EPFL)** 2022–Present
Institute of Mathematics (Postdoctoral researcher)

**Georgia Tech** 2017–2022
School of Electrical and Computer Engineering (GRA/GTA)
School of Interactive Computing (GTA)

**Georgia Tech Research Institute** 2016–2017
Robotics and Autonomous Systems Division (Intern and GRA)

**Raytheon Missile Systems** Summer 2015
Systems Test Division (Intern)

**Honors**

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| Georgia Tech CSIP Outstanding Research Award | 2022 |
| Georgia Tech ECE Cleaver Award (best Ph.D. proposal) | 2020 |
| Georgia Tech ARC-TRIAD fellowship | 2020 |
| SPARS workshop finalist for Best Student Paper Award | 2019 |
| Georgia Tech President's Fellowship | 2017–2021 |
| Georgia Tech ECE Cleaver Award (highest prelim score) | 2016 |
| Georgia Tech Faculty Honors (perfect GPA), eight semesters | 2012–2015 |

**Preprints**

**Andrew D. McRae** and Nicolas Boumal, "Benign landscapes of low-dimensional relaxations for orthogonal synchronization on general graphs," 2023, arXiv: 2307.02941 [math.OC]

Chiraag Kaushik, **Andrew D. McRae**, Mark A. Davenport, and Vidya Muthukumar, "New Equivalences Between Interpolation and SVMs: Kernels and Structured Features," 2023, arXiv: 2305.02304 [stat.ML]

**Journal Publications**

**Andrew D. McRae**, Justin Romberg, and Mark A. Davenport, "Optimal convex lifted sparse phase retrieval and PCA with an atomic matrix norm regularizer," *IEEE Trans. Inf. Theory* 69, no. 3 (2023): 1866–1882

**Andrew D. McRae** and Mark A. Davenport, "Low-rank Matrix Completion and Denoising Under Poisson Noise," *Inform. Inference.* 10, no. 2 (2021): 697–720

**Conference Publications**

**Andrew D. McRae**, Austin Xu, Jihui Jin, Namrata Nadagouda, Nauman Ahad, Peimeng Guan, Santhosh Karnik, and Mark A. Davenport, "Delta Distancing: A Lifting Approach to Localizing Items from User Comparisons," in *Proc. IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)* (Singapore, May 2022)

**Andrew D. McRae**, Santhosh Karnik, Mark A. Davenport, and Vidya Muthukumar, "Harmless interpolation in regression and classification with structured features," in *Proc. Int. Conf. Artif. Intell. Statist. (AISTATS)* (Virtual conference, March 2022)

**Andrew D. McRae**, Justin Romberg, and Mark A. Davenport, "Sample Complexity and Effective Dimension for Regression on Manifolds," in *Proc. Conf. Neural Inf. Process. Syst. (NeurIPS)* (Virtual conference, December 2020)

**Presentations**

"The rank-relaxed optimization landscape for orthogonal group synchronization on a general graph," in *Found. Comput. Math. Conference* (Paris, June 2023)

"Delta Distancing: A Lifting Approach to Localizing Items From User Comparisons," in *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)* (Singapore, May 2022)

"Harmless interpolation in regression and classification with structured features," in *Int. Conf. Artif. Intell. Statist. (AISTATS)* (Virtual conference, March 2022)

"An Atomic Matrix Norm Regularizer for Sparse Phase Retrieval and PCA," in *Georgia Tech ACO Student Seminar* (Atlanta, Georgia, September 2021)

"Risk bounds for regression and classification with structured feature maps," in *IFDS-MADLab Work. on Statistical Approaches to Understanding Modern ML Methods* (Madison, Wisconsin, August 2021)

"Sample complexity and effective dimension for regression on manifolds," in *Conf. Neural Inf. Process. Syst. (NeurIPS)* (Virtual conference, December 2020)

"Low-rank Matrix Completion and Denoising Under Poisson Noise," in *IAS Work. on Missing Data Challenges in Computation, Statistics and Applications* (Virtual conference, September 2020)

"Sample Complexity and Effective Dimension for Regression on Manifolds," in *Bernoulli-IMS One World Symp.* (Virtual conference, August 2020)

"Effective Dimension in Sample-complexity Bounds for Hilbert Space Regression," in *Int. Conf. High-Dimensional Probability* (Virtual conference, June 2020)

"Low-rank Matrix Completion and Denoising Under Poisson Noise," in *Rice University DSP Seminar* (Houston, Texas, October 2019)

"Low-rank Matrix Completion and Denoising Under Poisson Noise," in *Work. on Signal Processing with Adaptive Sparse Structured Representations (SPARS)* (Toulouse, France, July 2019) (**finalist for Best Student Paper Award** for extended abstract)

**Teaching Experience**

Intro. Artificial Intelligence (CS 3600, Georgia Tech) — Spring 2022
Intro. Signal Processing (ECE 2026, Georgia Tech) — Fall 2020, Spring 2021

*As a teaching assistant:*
Theory of Stochastic Calculus (MATH 431, EPFL) — Fall 2022
Convex Optimization (ECE special topics, Georgia Tech) — Spring 2019

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| | Statistical Machine Learning (ECE 6254, Georgia Tech) | Spring 2018 |
| | Adv. Digital Signal Processing (ECE 6250, Georgia Tech) | Fall 2017 |
| | Intro. Signal Processing (ECE 2026, Georgia Tech) | Spring 2016 |
| | Calculus III (Math 2401, Georgia Tech) | Spring 2015 |
| | Calculus II (Math 1502, Georgia Tech) | Fall 2014 |
| **Journal Reviewing** | *IEEE Trans. Signal Processing* | |
| | *IEEE Trans. Information Theory* | |
| | *IEEE Trans. Pattern Analysis and Machine Intelligence* | |
| | *EURASIP J. Advances in Signal Processing* | |
| **Conference Reviewing** | *Int. Conf. Artificial Intelligence and Statistics (AISTATS)* | |
| | *IEEE Int. Conf. on Acoustics, Speech, and Signal Processing (ICASSP)* | |
| **Other Service** | Team leader and jury member for Int. Math. Competition (IMC) | 2023 |
| | Reviewer of Ph.D. program applications for Georgia Tech ECE | 2022 |
| | Officer, Eta Kappa Nu (Beta Mu Chapter) | 2015–2017 |