

Raphael A. Meyer

✉ ram900@nyu.edu • 🌐 ram900.com

Education

New York University

Ph.D. in Computer Science

Advised by Prof. Christopher Musco

Pearl Brownstein Doctoral Research Award for Best Dissertation:

Towards Optimal Matrix-Vector Oracle Model in Numerical Linear Algebra

Deborah Rosenthal, MD Award for Best Quads Examination:

Towards Optimal Spectral Sum Estimation in the Matrix-Vector Oracle Model

Brooklyn, NY

2019–2024

Purdue University

B.S. in Computer Science Honors

Concentrations in Foundations of CS, Computational Science, Machine Intelligence

Minors in Math, Electrical Engineering

West Lafayette, IN

2015–2019

Research Interests

I research problems in Numerical Linear Algebra from the perspective of Theoretical Computer Science

- Randomized Linear Algebra (RandNLA)
- Theoretical Computer Science
- Information-Theoretic Lower Bounds
- Applied Mathematics

Work Experience

Teaching Assistant.....

Responsible Data Science

New York University

New York, NY

Spring 2024

Algorithmic Machine Learning and Data Science

New York University

Brooklyn, NY

Fall 2023

Responsible Data Science

New York University

New York, NY

Spring 2023

Machine Learning

New York University

Brooklyn, NY

Fall 2022

Algorithmic Machine Learning and Data Science

New York University

Brooklyn, NY

Fall 2020

Introduction to Machine Learning

New York University

Brooklyn, NY

Spring 2020

Introduction to Algorithmic Analysis

Purdue University

West Lafayette, IN

Fall 2018

Undergraduate Research Assistant.....

Theoretical Machine Learning **West Lafayette, IN**
Purdue University, with Prof. Jean Honorio *2018-2019*

Information-Theoretic Cryptography **West Lafayette, IN**
Purdue University, with Prof. Hemanta K. Maji *2016-2018*

Internships.....

Software Engineering Intern **New York, NY**
Bloomberg L.P. *Summer 2017*

Software Engineering Intern **New York, NY**
Bloomberg L.P. *Summer 2016*

Honors and Awards

Pearl Brownstein Doctoral Research Award for Best Thesis: NYU CSE Department *2024*
Deborah Rosenthal, MD Award for Best Qualls Exam: NYU CSE Department *2021*
Outstanding Reviewer Award: NeurIPS Conference *2021*
Student Travel Grant: ICML Conference *2019*
School of Engineering Fellowship: New York University *2019*
Finalist: CRA Outstanding Undergraduate Research Award *2018*
Student Travel Grant: ISIT Conference *2017*
Outstanding Sophomore of the Year: Purdue Computer Science *2016–2017*
Silver Medal, Giant Slalom: Ecole de Ski Français *2016*
Qualcomm Rookie Team of the Year: Boilermake Hackathon *2015*
Top Ten Hacks: Boilermake Hackathon *2015*
Certificate of Cuisine: Cordon Blue School of Gourmet Cuisine *2015*

Publications

- **Algorithm-Agnostic Low-Rank Approximation of Operator Monotone Matrix Functions**
with David Persson and Christopher Musco *in submission*.
- **Hutchinson’s Estimator is Bad at Kronecker-Trace-Estimation**
with Haim Avron *in submission*.
- **On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation**
with Cameron Musco and Christopher Musco at *SODA 2024*.
- **Near-Linear Sample Complexity for Lp Polynomial Regression**
with Cameron Musco, Christopher Musco, David P. Woodruff, and Samson Zhou at *SODA 2023*.
- **Fast Regression for Structured Inputs**
with Cameron Musco, Christopher Musco, David P. Woodruff, and Samson Zhou at *ICLR 2022*.

- **Hutch++: Optimal Stochastic Trace Estimation**
with Cameron Musco, Christopher Musco, and David P. Woodruff at *SOSA 2021*.
- **The Statistical Cost of Robust Kernel Hyperparameter Tuning**
with Christopher Musco at *NeurIPS 2020*.
- **Optimality Implies Kernel Sum Classifiers are Statistically Efficient**
with Jean Honorio at *ICML 2019*.
- **Characterizing Optimal Security and Round-Complexity for Secure OR Evaluation**
with Amisha Jhanji and Hemanta K. Maji at *ISIT 2017*.

Talks & Presentations

Invited Talks.....

Optimal Trace Estimation and Sub-optimal Kronecker-Trace Estimation	Presentation
<i>Talk § Center for Communications Research</i>	<i>2023</i>
Hutch++ and funNyström 2	Presentation
<i>Mahoney Group Talk § University of California, Berkeley</i>	<i>2024</i>
Optimal Trace Estimation and Sub-optimal Kronecker-Trace Estimation	Presentation
<i>Theory Lunch § University of Chicago</i>	<i>2023</i>
On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	Presentation
<i>Perspectives on Matrix Computations § BIRS</i>	<i>2023</i>
On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	Presentation
<i>Theory Seminar § Purdue University</i>	<i>2022</i>
Near-Linear Sample Complexity for Lp Polynomial Regression	Presentation
<i>CDS Student Seminar § New York University</i>	<i>2022</i>
Hutch++ and More: Towards Optimal Spectral Sum Estimation	Presentation
<i>Computational Lower Bounds in Linear Algebra § SIAM AN22</i>	<i>2021</i>
Lessons from Trace Estimation Lower Bounds	Presentation
<i>Computational Lower Bounds in Linear Algebra § SIAM AN21</i>	<i>2021</i>
Hutch++: Optimal Stochastic Trace Estimation	Presentation
<i>Theory Seminar § Johns Hopkins University</i>	<i>2021</i>

Conference Presentations.....

On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	Presentation
<i>SODA Conference</i>	<i>2024</i>
On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	Presentation
<i>Conference on Fast Direct Solvers</i>	<i>2023</i>
Hutchinson's Estimator is Bad at Kronecker-Trace-Estimation	Presentation
<i>SIAM-NNP Conference</i>	<i>2023</i>

On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation <i>GAMM ANLA Conference</i>	Presentation 2023
Near-Linear Sample Complexity for L_p Polynomial Regression <i>SODA Conference</i>	Presentation 2023
Fast Regression for Structured Inputs <i>ICLR Conference</i>	Poster 2022
Hutch++: Optimal Stochastic Trace Estimation <i>WALD(O) Conference</i>	Poster 2021
Hutch++: Optimal Stochastic Trace Estimation <i>SOSA Conference</i>	Presentation 2021
The Statistical Cost of Robust Kernel Hyperparameter Tuning <i>NeurIPS Conference</i>	Poster 2020
Statistical Efficiency of Optimal Kernel Sum Classifiers <i>ICML Conference</i>	Presentation, Poster 2019
Statistical Efficiency of Optimal Kernel Sum Classifiers <i>Midwest Theory Day</i>	Poster 2019
Optimal Secure OR Evaluation <i>ISIT Conference</i>	Presentation 2017
Reading Groups.....	
Feature Importance Impossibility Theorems <i>NYU Responsible AI Reading Group</i>	Presentation 2023
Fairwashing SHAP, or Interventional and Observational Shapley Values <i>NYU Responsible AI Reading Group</i>	Presentation 2023
The Equivalences of Matrix-Vector Complexity in Quantum Computing <i>NYU/UMass Quantum Linear Algebra Reading Group</i>	Presentation 2023
Hutch++: Optimal Stochastic Trace Estimation <i>NYU VIDA Reading Group</i>	Presentation 2022
Introduction to Leverage Scores <i>NYU Tandon Theory Reading Group</i>	Presentation 2021
Strategies for Episodic Tabular & Linear MDPs <i>NYU Tandon Reinforcement Learning Reading Group</i>	Presentation 2021
Lagrangian Duality <i>NYU Tandon Theory Reading Group</i>	Presentation 2021
Introduction to Differential Entropy <i>NYU CDS Reading Group on Information Theory</i>	Presentation 2020
Lower Bounds for the Oracle Complexity of Convex Optimization <i>NYU Tandon AMLDS Reading Group</i>	Presentation 2019

Service

Organizer: SIAM-NNP Symposium on <i>Matrix-Vector Complexity in Linear Algebra</i> (link)	2023
Organizer: NYU Tandon TCS “Pandemic Presentations” Day (link)	2022
Organizer: NYU Tandon TCS Reading Group	2021
NeurIPS Conference: Conference Reviewer	2024
FOCS Conference: External Conference Reviewer	2024
IMA Journal of Numerical Analysis: Reviewer	2024
ICALP Conference: External Conference Reviewer	2024
ICML Conference: Conference Reviewer	2024
IJCAI Conference: Conference Reviewer	2024
ICLR Conference: Conference Reviewer	2024
NeurIPS Conference: Conference Reviewer	2023
TMLR Journal: Conference Reviewer	2023
ICLR Conference: Conference Reviewer	2023
SODA Conference: External Conference Reviewer	2023
NeurIPS Conference: Conference Reviewer	2022
ICML Conference: Conference Reviewer	2022
STOC Conference: External Conference Reviewer	2022
ICLR Conference: Conference Reviewer	2022
NeurIPS Conference: Conference Reviewer	2021
ISIT Conference: External Conference Reviewer	2017