Raphael A. Meyer

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Fifth Year Ph.D. Student   Theoretical Computer Science

Education

New York University   **Brooklyn, NY**
Ph.D. in Computer Science   *2019–2024*
Advised by Prof. Christopher Musco
Deborah Rosenthal, MD Award for Best Quals Examination:
> *Towards Optimal Spectral Sum Estimation in the Matrix-Vector Oracle Model*

Purdue University   **West Lafayette, IN**
B.S. in Computer Science Honors   *2015–2019*
Concentrations in Foundations of CS, Computational Science, Machine Intelligence
Minors in Math, Electrical Engineering
Completed 15 Graduate Courses

Research Interests

I research the interplay of <u>Statistics</u> and <u>Computation</u>, largely through the lens of <u>Linear Algebra</u>.

▶ Randomized Linear Algebra (RandNLA)   ▶ Foundations of Data Science

▶ Statistical & Computational Lower Bounds   ▶ Optimization & Machine Learning

Work Experience

Teaching Assistant

Algorithmic Machine Learning and Data Science   **New York, NY**
New York University   *Fall 2023*

Responsible Data Science   **New York, NY**
New York University   *Spring 2023*

Machine Learning   **Brooklyn, NY**
New York University   *Fall 2022*

Algorithmic Machine Learning and Data Science   **Brooklyn, NY**
New York University   *Fall 2020*

Introduction to Machine Learning   **Brooklyn, NY**
New York University   *Spring 2020*

Introduction to Algorithmic Analysis   **West Lafayette, IN**
Purdue University   *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*
- Recognized, Tested, and Proved Inefficiencies with Existing Distributed Scheduler
- Integrated New Service to Observe System Load and be able to Learn Smart Solutions
- Cleared Technical Debt by Resolving bugs, Collecting Metrics, Automating Workflows

Software Engineering Intern   **New York, NY**
Bloomberg L.P.   *Summer 2016*
- Integrated various Database, PubSub, and API platforms to provide a new format of data
- Iteratively designed to guarantee the API we produce matches Client Expectations
- Learned to code Effective, Maintainable, and Production-Worthy code

Service

Organizer: SIAM-NNP Minisymposium on *The Matrix-Vector Complexity of Linear Algebra*   2023
Organizer: NYU Tandon TCS "Pandemic Presentations" Day (link)   2022
Organizer: NYU Tandon TCS Reading Group   2021

ICLR Conference: Conference Reviewer   *2024*
NeurIPS Conference: 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*

Honors and Awards

Deborah Rosenthal, MD Award for Best Quals Exam: New York University   *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

► **On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation**
with Cameron Musco and Christopher Musco *in submission*.

► **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

On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	**Presentation**
Perspectives on Matrix Computations § *BIRS*	*2023*
On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	**Presentation**
Theory Reading Group § *Purdue University*	*2022*
Hutch++ and More: Towards Optimal Spectral Sum Estimation	**Presentation**
Computational Lower Bounds in Linear Algebra § *SIAM AN22*	*2021*
Lessons from Trace Estimation Lower Bounds	**Presentation**
Computational Lower Bounds in Linear Algebra § *SIAM AN21*	*2021*
Hutch++: Optimal Stochastic Trace Estimation	**Presentation**
Theory Reading Group § *Johns Hopkins University*	*2021*

Conference Presentations

On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation	**Presentation**
GAMM ANLA Conference	*2023*

Near-Linear Sample Complexity for Lp Polynomial Regression	**Presentation**
SODA Conference	*2023*
Fast Regression for Structured Inputs	**Poster**
ICLR Conference	*2022*
Hutch++: Optimal Stochastic Trace Estimation	**Poster**
WALD(O) Conference	*2021*
Hutch++: Optimal Stochastic Trace Estimation	**Presentation**
SOSA Conference	*2021*
The Statistical Cost of Robust Kernel Hyperparameter Tuning	**Poster**
NeurIPS Conference	*2020*
Statistical Efficiency of Optimal Kernel Sum Classifiers	**Presentation, Poster**
ICML Conference	*2019*
Statistical Efficiency of Optimal Kernel Sum Classifiers	**Poster**
Midwest Theory Day	*2019*
Optimal Secure OR Evaluation	**Presentation**
ISIT Conference	*2017*

Reading Groups

The Equivalences of Matrix-Vector Complexity in Quantum Computing	**Presentation**
NYU/UMass Quantum Linear Algebra Reading Group	*2023*
Hutch++: Optimal Stochastic Trace Estimation	**Presentation**
NYU VIDA Reading Group	*2022*
Introduction to Leverage Scores	**Presentation**
NYU Tandon Theory Reading Group	*2021*
Strategies for Episodic Tabular & Linear MDPs	**Presentation**
NYU Tandon Reinforcement Learning Reading Group	*2021*
Lagrangian Duality	**Presentation**
NYU Tandon Theory Reading Group	*2021*
Introduction to Differential Entropy	**Presentation**
NYU CDS Reading Group on Information Theory	*2020*
Lower Bounds for the Oracle Complexity of Convex Optimization	**Presentation**
NYU Tandon AMLDS Reading Group	*2019*

Programming Languages

Julia, Python, C++, C, LaTeX, Racket:	*Proficient*
Wrote Production-Worthy Code in Multiple Software Engineering Internships	