

# Raphael A. Meyer

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Fifth Year Ph.D. Student      Theoretical Computer Science

## Education

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**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

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I research the interplay of Statistics and Computation, largely through the lens of Linear Algebra.

- ▶ Randomized Linear Algebra (RandNLA)
- ▶ Foundations of Data Science
- ▶ Statistical & Computational Lower Bounds
- ▶ Optimization & Machine Learning

## Work Experience

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**Graduate 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*

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

## Honors and Awards

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**Deborah Rosenthal, MD Award for Best Qualls 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

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- **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

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### Invited Talks.....

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

### Conference Presentations.....

<b>Hutchinson's Estimator is Bad at Kronecker-Trace-Estimation</b>	<b>Presentation</b>
<i>SIAM-NNP Conference</i>	2023
<b>On the Unreasonable Effectiveness of Single Vector Krylov for Low-Rank Approximation</b>	<b>Presentation</b>
<i>GAMM ANLA Conference</i>	2023
<b>Near-Linear Sample Complexity for Lp Polynomial Regression</b>	<b>Presentation</b>
<i>SODA Conference</i>	2023
<b>Fast Regression for Structured Inputs</b>	<b>Poster</b>
<i>ICLR Conference</i>	2022
<b>Hutch++: Optimal Stochastic Trace Estimation</b>	<b>Poster</b>
<i>WALD(O) Conference</i>	2021
<b>Hutch++: Optimal Stochastic Trace Estimation</b>	<b>Presentation</b>
<i>SOSA Conference</i>	2021
<b>The Statistical Cost of Robust Kernel Hyperparameter Tuning</b>	<b>Poster</b>
<i>NeurIPS Conference</i>	2020
<b>Statistical Efficiency of Optimal Kernel Sum Classifiers</b>	<b>Presentation, Poster</b>
<i>ICML Conference</i>	2019

<b>Statistical Efficiency of Optimal Kernel Sum Classifiers</b>	<b>Poster</b>
<i>Midwest Theory Day</i>	<i>2019</i>

<b>Optimal Secure OR Evaluation</b>	<b>Presentation</b>
<i>ISIT Conference</i>	<i>2017</i>

## Reading Groups.....

<b>The Equivalences of Matrix-Vector Complexity in Quantum Computing</b>	<b>Presentation</b>
<i>NYU/UMass Quantum Linear Algebra Reading Group</i>	<i>2023</i>

<b>Hutch++: Optimal Stochastic Trace Estimation</b>	<b>Presentation</b>
<i>NYU VIDA Reading Group</i>	<i>2022</i>

<b>Introduction to Leverage Scores</b>	<b>Presentation</b>
<i>NYU Tandon Theory Reading Group</i>	<i>2021</i>

<b>Strategies for Episodic Tabular &amp; Linear MDPs</b>	<b>Presentation</b>
<i>NYU Tandon Reinforcement Learning Reading Group</i>	<i>2021</i>

<b>Lagrangian Duality</b>	<b>Presentation</b>
<i>NYU Tandon Theory Reading Group</i>	<i>2021</i>

<b>Introduction to Differential Entropy</b>	<b>Presentation</b>
<i>NYU CDS Reading Group on Information Theory</i>	<i>2020</i>

<b>Lower Bounds for the Oracle Complexity of Convex Optimization</b>	<b>Presentation</b>
<i>NYU Tandon AMLDS Reading Group</i>	<i>2019</i>

## Service

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<b>Organizer:</b> SIAM-NNP Symposium on <i>Matrix-Vector Complexity in Linear Algebra</i> ( <a href="#">link</a> )	<i>2023</i>
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<b>Organizer:</b> NYU Tandon TCS “Pandemic Presentations” Day ( <a href="#">link</a> )	<i>2022</i>
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<b>Organizer:</b> NYU Tandon TCS Reading Group	<i>2021</i>
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<b>ICLR Conference:</b> Conference Reviewer	<i>2024</i>
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<b>NeurIPS Conference:</b> Conference Reviewer	<i>2023</i>
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<b>TMLR Journal:</b> Conference Reviewer	<i>2023</i>
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<b>ICLR Conference:</b> Conference Reviewer	<i>2023</i>
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<b>SODA Conference:</b> External Conference Reviewer	<i>2023</i>
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<b>NeurIPS Conference:</b> Conference Reviewer	<i>2022</i>
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<b>ICML Conference:</b> Conference Reviewer	<i>2022</i>
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<b>STOC Conference:</b> External Conference Reviewer	<i>2022</i>
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<b>ICLR Conference:</b> Conference Reviewer	<i>2022</i>
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<b>NeurIPS Conference:</b> Conference Reviewer	<i>2021</i>
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<b>ISIT Conference:</b> External Conference Reviewer	<i>2017</i>
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## Programming Languages

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**Julia, Python, C++, C, LaTeX, Racket:**

*Proficient*

Wrote Production-Worthy Code in Multiple Software Engineering Internships