

# Arya Maheshwari

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## EDUCATION

**Princeton University** (Princeton, NJ)

Aug. 2021 – May 2025

Major: Computer Science, Minor: Mathematics. GPA: 4.00 / 4.00.

Awards: Goldwater Scholarship, Freshman First Honor Prize, Phi Beta Kappa, Shapiro Prize for Academic Excellence

Adviser: Matt Weinberg

Coursework: 10 A+s received (*each A+ requires written faculty endorsement*). Relevant courses on Page 2.

Budapest Semesters in Math (Study Abroad, Spring 2024): A+s in all courses.

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## RESEARCH

**Algorithmic Game Theory/Mechanism Design Research** (Princeton University)

October 2023 – present

- [Junior paper](#) under Matt Weinberg on lower bound constructions for matroid intersection prophet inequalities.

- Current senior thesis on improving sample complexity of reductions to truthful auction mechanisms for an additive buyer.

**Algorithmic Graph Theory Research** (Budapest Semesters in Math)

January 2024 – May 2024

- Proved a new dichotomy theorem on the degree sequence graphicality problem for 3-uniform hypergraphs, mentored by István Miklós (Rényi Institute). Resolves complexity of this decision problem over all degree intervals.

Publication: In submission to *Journal of Combinatorial Theory*. Presentation at Joint Mathematics Meeting 2025. [\[arXiv\]](#)

**Quantum Research Intern** (IBM Research)

May 2023 – August 2023

- Worked on theoretical research and implementations for new quantum compilation algorithms at IBM Quantum.

- Proved new result for controlling the space-depth tradeoff in parity synthesis for Hamiltonian simulation circuits.

Publication: Paper on theoretical results currently being drafted. Code used for benchmarks in another recent paper ([here](#)).

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## ADDITIONAL PROJECTS

**Combinatorial BMM via Graph Decomposition** [\[paper\]](#): Surveyed recent breakthrough in fine-grained complexity on combinatorial boolean matrix multiplication (Advanced Algorithm Design final project).

**Incentive Compatible AMMs in Binary Prediction Markets** [\[poster, paper\]](#): Studied market scoring rules in automated market makers (DeFi final project). Outstanding Poster award at Princeton's 2023 DeCenter Conference on blockchains.

**Spectral Graph Theory** (Directed Reading Program): Studied Spielman's manuscript and worked on computational project on Graph Hot Spots Conjecture with PhD student mentor.

**Variational Quantum Algorithms (VQAs)**: Developed VQA pipeline for creating thermal states with CS dept. researchers.

**Applying GPT-3 and Dense Embeddings to NLPProofS** [\[poster, paper\]](#): NLP final project on proof generation.

**High School Astrophysics Research**: Studied stellar stream formation, supernova modeling, and rare star classification. [Paper](#) published in Harvard JEI. Presentations at [233<sup>rd</sup> AAS Meeting](#) and [2020 APS Meeting](#) (first-author).

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## LEADERSHIP & EXPERIENCE

**Princeton ACM Chapter: President, Adviser** (Association for Computing Machinery)

April 2022 – present

- Led organization of COSCON, Princeton's main CS contest, and guided competitive programming team as president.

- Mentoring current officers and members as an advising officer in 2024-25 year, alongside faculty adviser Pedro Paredes.

**Software Engineering Intern: Jane Street**

May 2024 – August 2024

- Developed the first OCaml-native dataframe library, leveraging advanced functional programming and algebraic data types.

- Project selected for [blog post](#) highlight (3 out of 80+) by Jane Street's head of technology. Received return offer.

**Software Engineering Intern: Two Sigma**

May 2022 – August 2022

- Developed new history tracking functionality for Two Sigma's distributed web service platform. Received return offer.

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## COURSEWORK & TEACHING

### Relevant Coursework:

- Graduate: Advanced Algorithm Design, Algorithmic Mechanism Design, Theoretical Machine Learning
- Economics & Computing, Cryptography, Decentralized Finance, Quantum Computing, Algorithms/DS
- Probability, Combinatorics, Abstract Algebra, Discrete Math, Honors Linear Algebra, Single Variable Analysis
- Natural Language Processing, Regression, Functional Programming, Programming Systems
- Budapest Semesters in Math (BSM): Graph Theory, Topology, Research course on algorithmic problems on hypergraphs (BSM courses under professors from Rényi Institute of Mathematics).

### Teaching Experience (Princeton University, CS and Math Departments)

- Combinatorics [MAT377]: Teaching Assistant (*under Prof. Noga Alon*) (Fall 2024)
- Discrete Math [COS240]: Teaching Assistant (*under Dr. Iasonas Petras*) (Fall 2024)
- Algorithms/DS [COS226]: Precept Assistant (Spring + Fall 2022)

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## HONORS & AWARDS

**Phi Beta Kappa, Early Induction** (Princeton University) September 2024  
- Inducted early into Princeton chapter of nation's oldest academic honor society. Top ~2% of senior class.

**2023 Barry M. Goldwater Scholar** (Princeton University) March 2023  
- Awarded prestigious national STEM research scholarship for sophomores/juniors as one of four students nominated by Princeton, based on research and academic record. First sophomore to win the Goldwater from Princeton in seven years.

**Freshman First Honor Prize** (Princeton University) August 2022  
- Awarded to two students with highest academic standing out of all second-year students at Princeton, for "exceptional achievement during the first year."

**Princeton Qiskit Fall Fest 2022: 2nd Place** (Princeton University) October 2022  
- Placed 2nd in Princeton-wide quantum computing competition focusing on quantum search (Grover's algorithm).

**Shapiro Prize for Academic Excellence** (Princeton University) August 2022, August 2023  
- Annual academic prize awarded to top ~3% of first- and second-year students. Won both years.

**USA Computing Olympiad: Platinum Division Competitor** (High School) March 2020  
- Qualified to prestigious top division of the national computing olympiad (USACO) with a perfect score in Gold contest.

**American Invitational Mathematics Exam (AIME) Qualifier** (High School) February 2019 – 2021  
- Three-time AIME qualifier from national AMC10 and AMC12 exams.

**AP Computer Science A, AP Statistics Perfect Scores** (High School) May 2021, May 2018  
- One of 2 students worldwide (183,000 test-takers) to perfect score AP Statistics. One of 166 (66,000 test-takers) for AP CS.

**USA Astronomy & Astrophysics Olympiad (USAAAO): First Round Top 40** (High School) February 2020  
- Qualified to National Astronomy Competition as one of the top 40 students nationally in the first round.