Joshua Lin

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Education

Princeton University, A.B. Mathematics (Expected) Aug 2023 - May 2027

Minors in Computer Science, Statistics & Machine Learning *GPA: 3.8/4.0*

- Relevant Coursework: Linear & Nonlinear Optimization†, Machine Learning Theory†, Functional Analysis†, Complex Analysis, Numerical Analysis, Measure-Theoretic Probability Theory, Algorithmic Game Theory, Theory of Algorithms.
- Awards & Activities: Princeton Physics Pyka Memorial Prize for "promise in independent research," ACM Competition Chair, Tournaments Officer for Princeton Quantitative Traders, Tour Director for the Princeton Debate Panel.

† Denotes graduate coursework.

Experience

Statistical Astrophysics Researcher May 2025 - Present

Princeton Astrophysical Data Laboratory *Princeton, NJ*

- Developing message-passing neural network in PyTorch-Geometric using individual properties of over $\mathcal{O}(10^5)$ galaxies and optical fibers to optimize interactions. Current model attains 98.1% performance of a constraint-free upper bound.
- Designed heterogeneous bipartite graph to model a class of high-dimensional combinatorial optimizations with $\mathcal{O}(10^{10})$ binary variables, constructing a noisy family of smooth functions to discretize the output. [See blog post.]
- My work will help direct the *Prime Focus Spectrograph*'s nightly second-year exposures. The PFS is an international consortium of twenty-seven universities and institutes studying galaxy evolution. [See overview paper.]

Mathematics Teaching Assistant Jun 2024 - Aug 2024

Jane Street Capital *New York, NY*

- Taught topics in probability, combinatorics, and number theory at the Academy of Mathematics and Programming.
- Facilitated probability games, market-making simulations, and the Electronic Trading Challenge.

Computational Physics Researcher Jan 2023 - May 2023

NASA Jet Propulsion Laboratory *Pasadena, CA*

- Developed numerical methods to approximate the ages of lithospheric bands and identify regions of geologic co-/re-activation in Europa's nondeformed and chaos terrains using NASA's geographical information system (GIS) databases.
- Fundamentally characterized unmapped regions on Europa by applying modern physical models to *Galileo* data.
- Presented at NASA-JPL summer research conference to physicists on the *Europa Clipper* science team.

Projects

Emergency Signaling System Nov 2023

Top Prize, HackPrinceton *Princeton, NJ*

- Developed "Moco" to discretely execute preset emergency calls, texts, and other customizable actions, triggered by customizable wrist gestures pre-calibrated with iOS app.
- Implemented gesture matching between live Apple Watch accelerometer/gyroscopic data and calibrations using iterative closest point for spatial transformations and dynamic time warping for temporal mappings.

Automated Securities Trader July 2023

Top Prize, Jane Street Electronic Trading Challenge *New York, NY*

- Engineered algorithms to systematically trade bonds, stocks, & ETFs against contestants in live six-hour competition.
- Achieved 1st place in both divisions: a) highest overall PNL, b) greatest peak (last-hour) PNL.

Skills, Interests, & Awards

Skills	Languages: C, C++, Python. Libraries: PyTorch/PyG, CVXPy, Tensorflow, Pandas, Scipy.
Interests	High-dimensional probability, statistical learning theory, and stochastic optimization.
Awards	Gates Scholarship, USAPhO Semifinalist (Honorable Mention), Wells Fargo Wealth Mgmt Comp 1st Prize.

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