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, Algorithmic Game Theory, Theory of Algorithms, Probability & Stochastic Systems.

– 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. § Denotes upcoming fall coursework.

Experience

Statistical Astrophysics Researcher Oct 2024 - 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 87% 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 guide the Prime Focus Spectrograph's second-year exposures later this fall. [The PFS is an international consortium of over twenty-five universities/national laboratories studying galaxy evolution.]

Directed Reading Program Participant Jun 2024 - Aug 2024

Princeton Mathematics Department *Hybrid | Princeton, NJ*

– Accelerated one-on-one study of topics in general relativity, with the requisite semi-Riemannian geometry.

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.

Skills, Interests, & Awards

Skills	Languages: C, C++, Python. Libraries: PyTorch/PyG, CVXPy, Tensorflow, Pandas, Scipy.
Interests	High-dimensional probability, statistical learning theory, geometric deep learning, and stochastic optimization.
Awards	Top Prize at Jane Street Electronic Trading Challenge, Bill and Melinda Gates Scholarship, USAPhO Semifinalist with Honorable Mention, Wells Fargo Wealth Management Competition National Champion.

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