# Joshua Lin

joshua-lintropic | Joshua Lin | lintropic.com | joshua.lin@princeton.edu | +559.691.0093

## EDUCATION

**Princeton University**, A.B. Mathematics $\hfill$ (Expected) Aug 2023 - May 2027

*Minors in Computer Science, Statistics & Machine Learning* $\hfill$ *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** $\hfill$ Oct 2024 - Present

*Princeton Astrophysical Data Laboratory* $\hfill$ *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 help direct the *Prime Focus Spectrograph*'s nightly second-year exposures this fall. The PFS is an international consortium of twenty-seven universities and institutes studying galaxy evolution. [See overview paper.]

**Directed Reading Program Participant** $\hfill$ Jun 2024 - Aug 2024

*Princeton Mathematics Department* $\hfill$ *Hybrid | Princeton, NJ*

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

**Mathematics Teaching Assistant** $\hfill$ Jun 2024 - Aug 2024

*Jane Street Capital* $\hfill$ *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** $\hfill$ Jan 2023 - May 2023

*NASA Jet Propulsion Laboratory* $\hfill$ *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** $\hfill$ Nov 2023

*Top Prize, HackPrinceton* $\hfill$ *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. |