

Nicole Jiang

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Education

University of Toronto – HBSc, Astronomy & Physics Specialist, Statistics Minor, Philosophy Minor 2024 – 2029
Relevant Coursework: *Computational Astrophysics, Stars and Planets, Galaxies and Cosmology, Introduction to Computer Programming, Practical Physics I, Multivariable Calculus with Proofs, Thermal Physics, Probability and Statistics I*

Skills

Programming: Python (NumPy, SciPy, pandas, astropy, Matplotlib), TypeScript, SQL, Bash; Git; SSH
Data/ML: scikit-learn; PyTorch; Transformers
Web/Tools: React, HTML/CSS, Vite; LaTeX, Overleaf, Jupyter, VS Code, Microsoft Office, Google Workspace

Experience

University of Toronto – Undergraduate Researcher [\[GitHub\]](#) February 2026 – Present

- Developing a standardized, provenance-tracked catalogue of JWST-identified accreting black holes at $z \geq 4$, mapping literature measurements onto a canonical schema while preserving uncertainties, inference methods, assumptions, and quality flags
- Designing and implementing vectorized NumPy models to test whether observed black-hole masses can be reproduced across parameter grids of seed mass, formation redshift, Eddington ratio, Kerr spin, radiative efficiency, and merger contribution
- Propagating asymmetric black-hole mass uncertainties through growth diagnostics using 10,000 Monte Carlo draws per object and ± 0.3 dex systematic shifts, producing probabilistic model-compatibility scores and follow-up rankings
- Producing growth tracks, parameter-space maps, compatibility heatmaps, and sensitivity analyses to visualize results
- Directing technical priorities while documenting and presenting findings to supervisor Prof. Pratika Dayal (CITA)

Royal Astronomical Society of Canada (RASC) – Journal Contributor [\[Journal\]](#) September 2025 – Present

- Producing planet ephemerides for the Royal Astronomical Society of Canada's bimonthly *Journal* using Stellarium software
- Curating tables of noteworthy observational astronomy events for the *Journal* centrespread
- Also assisting with observatory maintenance on work trips to the E.C. Carr Astronomical Observatory

Ontario Science Centre – Student Host February – June 2024

- Designed and prototyped an interactive exhibition about the chemistry of art restoration, successfully pitching it to Science Centre staff to ultimately engage 100+ visitors with the final installation
- Created and presented a puppet show to elementary school classrooms across Toronto, teaching solar-eclipse concepts

Research & Technical Projects

Galaxy Star-Formation Main Sequence Analysis with Cosmological Simulations May 2025

- Queried 11,000,000+ galaxy records from public cosmological simulation databases (EAGLE, IllustrisTNG) and processed catalogues using Python, SSH sessions, and pickle serialization
- Visualized SFR- M^* trends across simulation snapshots (redshifts $0 \leq z < 0.5$) using scatterplots and 2D histograms
- Compared single- vs multi-snapshot datasets to explore redshift-dependent trends in galaxy evolution
- Drafted an AAS-style scientific paper in LaTeX using the AAS journal submission Overleaf template

Predicting APA Site Choice from mRNA Sequences (ML) [\[Devpost\]](#) September 2025

- Runner-up in the Toronto Bioinformatics Hackathon as a five-member undergraduate team, placing 2/23 (\$500 prize) out of 115+ individual contestants, including many graduate students, postdocs, and industry researchers
- Built the data preprocessing pipeline to clean and format raw RNA sequences for the DNABERT-2-117M transformer genome foundation model. Scaled the pipeline and batched inputs to train the model on a curated dataset of ~800,000 sequences
- Codified and enforced data-format standards for training; blocked non-conforming samples and implemented checks
- Co-developed project strategy and presented results to judges; model achieved 86% poly(A) site prediction accuracy

Saturn and Moons Observation with HDR Imaging October – December 2024

- Captured and compiled photos of Saturn and its moons, calibrating a pixel-to-kilometre conversion to measure distances
- Validated measurements by cross-referencing with 189 images taken over the span of two months, and comparing measurements over time to accurately evaluate Titan's orbital period