Tianrui (Dennis) Wu

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EDUCATION

University of Arizona **Tucson, AZ**
Bachelor of Science in Physics and Mathematics *Jan 2026 – Dec 2026 (Expected)*

- ***GPA:*** 3.89/4.00, Dean's List, **Global Wildcat Scholarship** *($10k/year merit-based)*
- ***Coursework:*** Stochastic Calculus, Statistical Machine Learning, Advanced Mathematical Modeling

Duke University **Durham, NC**
Bachelor of Science in Physics and Mathematics, Computer Science Minor (not conferred) *Aug 2021 – Dec 2024*

- ***GPA:*** 3.92/4.00, Dean's List *with distinction*, **Faculty Scholars Finalist '24** (*highest honor, sole physics nominee*)
- ***Selected Coursework:*** Real Analysis, Advanced Probability, Stat. Learning & Inference, Graduate ML, Game Theory
- ***Extracurriculars:*** **Math TA (lin. algebra, prob.)**, Duke University; **Founder & President**, Duke Astronomy Club; **Chapter President**, Society of Physics Students; **APS Ambassador**; **Senior Editor**, Duke Vertices Science Journal

HONORS & AWARDS

Olympiads:

- National 1st Place, *US Physicists' Tournament 2026*
- Top Gold, *British Physics Olympiad 2021 (top 10)*
- Third Grand Award, *Regeneron ISEF 2021 (top 10)*

Scholarships:

- J. B. Burnell Scholarship 2024 *(sole recipient)*
- Member, ΣΠΣ *Honor Society (reserved for top physicists)*
- Outstanding Chapter Award 2023, *Society of Physics Students*

EXPERIENCE

Qrigin Capital *(startup proprietary trading firm, $35M)* **Remote**
Quantitative Researcher, Systematic Trader *Aug 2025 – Present*

- ***Alpha Discovery:*** Built an LSTM forecasting engine on phase-space features with full MLOps (MLflow), integrated 200+ multi-frequency factors with decay analysis and cross-sectional ranking, lifting win rates 3.1%
- ***Directional Strategy:*** Developed an HFT taker strategy on tick data, capturing short reversions with a confidence signal; deployed live at post-fee Sharpe 8.2 over 3 months on Coinbase Intl
- ***Optimal Execution:*** Architected TWAP, VWAP and implementation-shortfall algorithms for CTA books with microstructure timing overlays on child-order aggressiveness, cutting slippage ~2 bps vs TWAP across major exchanges
- ***Market Making:*** Built a dual-engine tick backtest stack with vectorized L2 queue-position fills; developed and validated a grid-based market-making strategy with out-of-sample Sharpe 9 over 3 months
- ***Trading & Risk:*** Ran CTA books on OKX, Binance and Coinbase, owning P&L, TCA and fee analysis; managed live risk on $35M with leverage, position and beta limits; trimmed exposure ahead of the Oct 2025 crash

Applied Technologies: Python (*PyTorch, MLflow, Polars, pandas, NumPy*), CEX APIs (*REST/WebSocket*), Grafana, Linux, Git

InsightCheck Investments *(systematic equity fund with CTA desk, $300M AUM)* **Shenzhen, China**
Quantitative Researcher *Feb 2025 – Aug 2025*

- ***Statistical Arb:*** Developed a market-neutral L/S equity strategy combining PCA statistical factors and ML signals with a covariance-based risk model, backtested at post-cost Sharpe 2.4
- ***Factor Research:*** Researched fundamental and microstructure alpha factors for Chinese A-shares, validating 62+ intraday factors with daily IC >0.01 and running cross-sectional portfolio optimization in Polars
- ***Orderbook Engine & Infra:*** Solely engineered an L3 market-by-order reconstruction engine (Python prototype migrated to C++), processing the full A-share universe in ~1 second per day; built a Dask backtester that cut evaluation cycles 10x

Applied Technologies: Python (*Polars, Dask*), C++, SQL, Linux, Git

PROJECTS

Density-field Forecasting with High Redshift Uncertainty | Python (*pandas, NumPy, Numba*), Linux HPC *2026*

- Sole analyst on a cosmology study with a PI and postdoc; forward-modeled redshift noise through to Bayesian posteriors
- Diagnosed and corrected a systematic bias in the MCMC pipeline by cross-validating two covariance estimators over a 250-cell sensitivity grid, cutting the bias 6-fold. First-author paper in prep: *BAO Reconstruction with Photo-z, PRD (2026)*

IMC Prosperity 4 Trading Competition | Python (*PyTorch*), Rust *2026*

- Ranked top 3% of 6,000+ teams using market making and cross-asset arbitrage driven by counterparty fingerprinting

Crypto Market Maker with Backtest Engine | Python (*pandas, Polars, NumPy, Numba, PyTorch*), Rust *2025*

- Built and deployed live ETH market making framework on OKX, combining EWMA flow alphas with CNN capturing orderbook patterns via phase-space features; averaged 0.5–1% daily return. *Project led to recruitment at Qrigin*

Neural Network Prediction of Power Spectrum Window Function | Python (*PyTorch*), Linux HPC *2024*

- As Caltech SURF Research Fellow with SPHEREx team, built a ResUNet CNN (PyTorch) for signal deconvolution on large-scale data, owning mock-data generation and distributed HPC training; achieved sub-percentage error

Understanding Dark Matter with Data | Python, Linux HPC *2022–2024*

- As a research assistant at Duke Cosmology Group, built Python pipelines analyzing 120 TB of simulation with MCMC-based Bayesian inference; co-author, *JWST*, ApJ (2024); *OpenUniverse2024*, MNRAS (2025)

SKILLS

Skills: Python (*PyTorch, Polars, pandas, NumPy, Numba, Dask, MLflow*), Rust, C/C++, SQL, Unix; English, Mandarin (native)
Markets: Digital Assets, Commodity Futures, Global Equities, Options (*completed Akuna 101 & 201*), Prediction Markets
Interests: Poker, Ranked GeoGuessr, Table Wargaming, Strategy Games, Chaos Theory, Forecasting, Astrophotography, Sci-fi