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## Education

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### University of California, Los Angeles

- **Ph.D.** Candidate, Mathematics. Aug 2021 – Jun/Dec 2026
- Advisor: Andrea L. Bertozzi. (GPA: 3.98/4.00)
- **Masters of Arts** in Mathematics. Aug 2021 – Jun 2022
- Relevant Courses: Statistical Learning, High-dim Statistics, Optimization, Causal Inference, Functional Analysis, PDEs.

### National University of Singapore

- **Bachelor of Science (Honours)** in Applied Mathematics with Highest Distinction. Aug 2017 – May 2021
- Second Major in Physics and Minor in Statistics. (GPA: 4.97/5.00)
- *Ho Family Prize* – Top graduating student in Applied Mathematics, with 28 A+'s in Math/Physics/Statistics courses.
- Relevant Courses: Math of Machine Learning, Bayesian Statistics, Differential Geometry, Statistical Mechanics.

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## Industrial/Work Experiences

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*Quantitative Research Intern*, WorldQuant Intraday Team Sep 2025 – Dec 2025

- Developed tensorized infrastructure in Python using amortized singular value decomposition for regression analysis.
- Productionized features from limit order book data pipeline via Slurm-orchestrated C++ infrastructure.

*Data Scientist Intern*, Amazon Search Data Science and Economics Jun 2025 – Sep 2025

- Pioneered novel framework combining  $\ell^0$ -changepoint detection with multi-agent LLMs for 78 search metrics in 17 locales to generate interpretable economic insights. (Paper with public dataset submitted to a conference.)
- Built production pipeline on AWS Bedrock AgentCore using Strands/LangChain with ECS/Docker orchestration.
- Spearheaded agentic coding initiatives and authored documentation on MCP servers and workflows.

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## Academic Experiences

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*Graduate Research Assistant*, UCLA 2022 – Present

- Developed a modified vector autoregressive framework using causal inference and double machine learning for confounding-adjusted lag detection in time series, implemented in Python with EconML. (Submitted to a conference.)
- Architected a novel object-oriented Python framework for continuum traffic modeling, integrating game-theoretic equilibrium, PDEs on directed graphs, and stochastic block coordinate descent optimization algorithms.
- Designed numerical PDE schemes with penalized regression for physics-informed flux functions and proved convergence using functional analysis and differential topology.

*Graduate Teaching Assistant*, UCLA 2021 – Present

- Developed 786 pages of instructional materials across 10 quarters for advanced mathematics courses (Algorithms, Probability, Graduate PDEs, Mathematical Finance, and Analysis), with an average teaching evaluation of 8.6/9.0.

*Undergraduate Research Assistant*, NUS 2020 – 2021

- Developed a numerical scheme incorporating hypothesis testing and regression in R for quantum field theory simulations.
- Co-authored a 148-page paper investigating a fundamental conjecture in mathematical general relativity.

*Undergraduate Research Assistant*, UNC – Chapel Hill 2019

- Designed Bayesian hierarchical models for analyzing astrophysical data with Markov chain Monte Carlo samplers in R.

*Undergraduate Teaching Assistant*, NUS 2019 – 2021

- Served as TA for discrete structures and Python programming across 5 semesters, with average feedback score of 4.8/5.0.

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## Selected Publications

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- *Generic Structural Stability for Riemann Solutions to  $2 \times 2$  System of Hyperbolic Conservation Laws.*  
H.K. Tan, A. L. Bertozzi. || SIAM Journal of Mathematical Analysis.
- *Hierarchical Bayesian Thermonuclear Rate for the  $7\text{Be}$  ( $n, p$ )  $7\text{Li}$  Big Bang Nucleosynthesis Reaction.*  
R.S de Souza, H.K. Tan, A. Coc, C. Iliadis. || The Astrophysical Journal 894 (2), 134.

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## Skills/Others

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- *Service*: Reviewer for AISTATS 2026.
- *Programming Languages & Frameworks*: Python (PyTorch, NumPy, cvxpy, ruptures, scikit-learn, statsmodels, pandas, causal-learn, EconML, strands, LangChain), R, SQL, AWS, GCP, Linux (Slurm), C++ (Intermediate), Git, LaTeX
- *AWS Stack*: EC2, S3, EventBridge, Glue/Crawler, Athena, Lambda, Fargate, ECS/ECR (Docker), Bedrock, AgentCore.