maxtanhk@math.ucla.edu
maxtanhk.com

Hong Kiat, Tan

Education

University of California, Los Angeles

- **Ph.D.** Candidate, Mathematics. Aug 2021 – (Jun 2026/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-dimensional Statistics, Optimization, Causal Inference, Functional Analysis.

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 Statistcs, Differential Geometry, PDEs, Statistical Mechanics.

Work Experiences

Quantitative Research Intern, WorldQuant Sep 2025 –
Data Scientist Intern, Amazon Search Data Science and Economics Jun 2025 – Sep 2025

- Pioneered the combination of using ℓ^0-changepoint detection algorithms for 78 search metrics in 17 locales with multi-agent LLMs to generate interpretable economic and business insights, implemented and orchestrated using Strands/LangGraph and ECS/Docker in AWS Bedrock AgentCore. (Paper with public dataset in progress.)
- Spearheaded internal adoption of agentic coding assistants, genAI tools, and MCP servers to accelerate workflows.

Academic Experiences

Graduate Research Assistant, UCLA 2022 – Present

- Developed the ORACLE-VARX framework using double machine learning and orthogonal regression to identify covariate-adjusted causal dependencies in high-dimensional and multivariate time series via vector autoregressive models, implemented in Python with EconML and statsmodels (submitted for a conference).
- Architected a continuum traffic network model from scratch in Python using object-oriented programming, integrating traffic data with stochastic block coordinate descent algorithms for high-dimensional models.
- Designed numerical schemes for PDEs from fluid dynamics and implemented penalized regression for physics-informed parametrized functions while analyzing properties via functional analysis and differential topology. (Paper on arXiv.)

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 novel numerical scheme in R for quantum field theory simulations, incorporating applied harmonic analysis, kernel regression, and statistical hypothesis testing.
- Co-authored a 148-page paper investigating a fundamental conjecture in mathematical general relativity (on arXiv).

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.

Selected Publications

- *Regularization of Complex Langevin Method.*
  Z. Cai, Y. Kuang, **H.K. Tan**. || Physical Review D 105 (1), 014508.
- *Hierarchical Bayesian Thermonuclear Rate for the 7Be (n, p) 7Li Big Bang Nucleosynthesis Reaction.*
  R.S de Souza, **H.K. Tan**, A. Coc, C. Iliadis. || The Astrophysical Journal 894 (2), 134.

Skills/Others

- *Programming Languages & Frameworks*: Python (NumPy, cvxopt, cvxpy, ruptures, SciPy, scikit-learn, statsmodels, pandas, PyTorch, causal-learn, EconML, strands, LangGraph), R, SQL, AWS, LaTeX.
- *AWS Stack:* EC2, S3, Glue/Crawler, Athena, Lambda, Fargate, ECS/ECR, Bedrock, Bedrock AgentCore.
- *Languages*: English & Mandarin Chinese (Native/Bilingual), Japanese (Intermediate).