Hsuan-Cheng (Alex) Wu

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Education

The Pennsylvania State University — United States
PhD Candidate in Mathematics, advisor: Xiantao Li — 2023 - Present

The Hong Kong University of Science and Technology — Hong Kong
BSc in Mathematics - International Research Enrichment Track — 2019 - 2023
Grade: First Class Honors

Publications and Preprints

[1] **Hsuan-Cheng Wu** and Xiantao Li. Universal Dilation of Linear Itô SDEs: Quantum Trajectories and Lindblad Simulation of Second Moments. arXiv:2601.05928, 2026

[2] **Hsuan-Cheng Wu**, Jingyao Wang and Xiantao Li. Quantum Algorithms for Nonlinear Dynamics: Revisiting Carleman Linearization with No Dissipative Conditions. SIAM Journal on Scientific Computing, Vol. 47, Iss. 2, 2025

[3] **Hsuan-Cheng Wu** and Xiantao Li. Structure-preserving quantum algorithms for linear and nonlinear Hamiltonian systems. arXiv:2405.12714, 2024

Conference Talks

- Carleman Linearization-based Quantum Algorithms and Beyond. SIAM Conference on Applications of Dynamical Systems, May 2025

Poster Talks

- Structure-preserving quantum algorithms for linear and nonlinear Hamiltonian systems. QIP, Feb 2025
- Quantum Algorithms for Nonlinear Dynamics: Revisiting Carleman Linearization with No Dissipative Conditions. QSIM, Aug 2024

Awards and Fellowships

NSF Funding "Improving quantum speedup for solving differential equations" (PI: XIantao Li) — 2023 - 2027
NSF QIP Mathematical Fellowship — 2025
Jack and Eleanor Pettit Scholarship in Science — 2023 - 2025
Shiing-Shen Chern Class Scholarship — 2022 - 2023
HKSAR Government Scholarship Fund – Reaching Out Award — 2022
Mr Tommy Zau Jr Memorial Scholarship — 2022
IRE Overseas Research Scholarship — 2022
HKUST University Full-tuition Admission Scholarship — 2019 - 2023

Professional Activities

Journal Reviewer: *Quantum, Communications in Mathematical Sciences*
Seminar Talk: *Quantum Computing Seminar at Penn State*
Visiting Research: *Summer Research at Columbia University with Prof. Kui Ren*
Ongoing Projects: *Integrating Quantum Algorithms with Quantum Error Mitigation: Advancing Practical Quantum Advantage - QCAN project - IBM, Universal Simulation of Differential Algebraic Equations, Quantum Neural ODEs*