Yimeng Cao

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Research Assistant | HKUST(GZ)

Education

Harbin Institute of Technology Sep 2023 - Jun 2026

M.Sc. in Probability and Mathematical Statistics, School of Mathematics Harbin

- Average grade: 85.4/100; ranked 3rd in the program's postgraduate scholarship ranking.

Huazhong Agricultural University Sep 2019 - Jun 2023

B.Sc. in Information and Computing Science, College of Informatics Wuhan

- Cumulative GPA: 3.93/4.00; ranked 2/98 in postgraduate recommendation (top ≈2%).

Research Interests

Quantum information theory; bipartite entanglement; LOCC/PPT distinguishability and quantum state discrimination; Hypothesis testing of symmetry in quantum dynamics.

Research Experience

School of Mathematics - Quantum Information Theory Group

- Fundamental training phase (Oct 2023 – Nov 2024): under the supervision of Prof. Ke Li, I completed a systematic reading course on John Watrous's *The Theory of Quantum Information* (including all exercises) and organized several group seminars. This work strengthened my foundations in quantum states, entanglement, quantum channels, and quantum hypothesis testing.
- Research phase (Dec 2024 – Present): collaborating with Prof. Dong Yang at Southern University of Science and Technology on LOCC/PPT distinguishability of four orthogonal pure states in a two-qubit bipartite system when two copies are available. This work includes a research visit to SUSTech (Dec 2024 – Jan 2025) to discuss progress and future directions.

Selected Research Problems and Ongoing Work

- **Adaptive LOCC on multiple copies** – how the structure of four orthogonal two-qubit states and their two-dimensional subspaces constrains perfect discrimination by adaptive LOCC on two copies.
- **Ensembles with one product and three entangled states (1P+3E)** – whether there exist such ensembles that are intrinsically hard to distinguish by LOCC and how this relates to their entanglement and product-state structure.
- **PPT measurement schemes on two copies** – how to design PPT measurements that distinguish orthonormal bases in two-qubit systems and what block structure they have on symmetric and antisymmetric subspaces.
- **Product states in orthogonal complements** – how many pairwise-orthogonal product states can lie in the orthogonal complement of the two-copy span of four orthogonal two-qubit states, and how this depends on the ensemble type (1P+3E, 2P+2E, 4E).

Honors & Awards

- Second Prize, 13th National College Student Mathematics Competition, 2021.
- First Prize (Hubei Division), National College Student Mathematical Modeling Contest, 2021.
- Second Prize, Mathematical Contest in Modeling (MCM/ICM), USA, 2022.
- First Prize, 11th Asia-Pacific Mathematical Contest in Modeling (APMCM), 2021.
- University First-Class Scholarship (twice), Harbin Institute of Technology.
- “Merit Student” and “Outstanding Graduate”, Huazhong Agricultural University.

Technical Skills

- **MATLAB / Simulink** – ~5 years of experience; over 12,000 lines of .m scripts for numerical experiments and figure generation for journal publications.
- **Python** – Proficient in Python (NumPy, SciPy, Pandas, Matplotlib) for scientific computing and data visualization.
- **Numerical optimization & theoretical analysis** – Familiar with convex optimization and duality theory; experienced with the UPB–Choi dual-cone technique.
- **English** – CET-6; able to read PRL/PRA papers and write technical summaries.