



Yu-Ao Chen

PhD in Applied Mathematics 08/1993 Beijing
 Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences
 +8615011065312 @ tcag@163.com Google Scholar

PhD in Mathematics, specializing in quantum computing, symbolic computation and cryptanalysis. I have a solid foundation in mathematics and algorithms. I am involved in multiple sub-fields of quantum computing. I have 12 years of experience in using Mathematica and am proficient in Python programming.

The highlight of the PhD period is the proposal of a [quantum algorithm for solving Boolean equations](#). While at Baidu, I was a core developer of QuantumLeaf, leading the development of multiple use case modules and compilation modules; I also served as the person in charge of developing the quantum singular value transformation toolkit, and improved the signal parameters in symmetric quantum signal processing in the project. The calculation algorithm ultimately runs a hundred times faster than competing products; I co-proposed a new quantum noise mitigation framework, and the result was accepted as a talk by TQC, the top quantum computing conference; I submitted a total of 24 patent applications, involving quantum algorithms, quantum computing platforms, quantum compilation, quantum noise mitigation, and super Conducted quantum chip design, ion trap quantum computing, post-quantum cryptography and many other directions.

Education

08/2011	Hua Luogeng Mathematics and Technology Talent Class, School of gifted young, University of Science and Technology of China
06/2015	BS in Mathematics and Applied Mathematics GPA 3.72/4.3
09/2015	Key Laboratory of Mathematics Mechanization, Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences
07/2020	PhD in Applied Mathematics, supervised by Prof. Xiao-Shan Gao

Work Experiences

07/2020	Senior Researcher at the Institute for Quantum Computing at Baidu Research
07/2023	<ul style="list-style-type: none">▶ QuantumLeaf and QCompute SDK: Core development member, responsible for algorithm design, leading the development of Shor module, Sub-chip module, Unroll module and other compilation modules▶ QCompute-QSVT: Person in charge and Executor, released the world's first quantum singular value transformation toolkit, and realized the generation of Hamiltonian simulation circuits at the software level for the first time in the world, opening up its classical input-quantum calculation-classical readout chain.▶ LIANG XI Private Deployment: Core members, responsible for customized development of algorithm modules▶ QuLearn: Core member, responsible for the main writing and verification of multiple chapters of the quantum learning knowledge base▶ AStar2020 Programming Competition Finals: Core member, responsible for the development of the back-end of the final platform
10/2023	Research Associate (part-time) at Thrust of Artificial Intelligence , Hong Kong University of Science and Technology (Guangzhou).
-	<ul style="list-style-type: none">▶ Research on quantum algorithm and quantum information

Core Skills

Python Python experienced | **Wolfram Mathematica** Specialist | \LaTeX Proficient

Papers

- › Xin Wang, **Yu-Ao Chen**, Lei Zhang, and Chenghong Zhu, “Reversible Entanglement Beyond Quantum Operations”, arXiv preprint, arXiv: 2312.04456(2023).
- › **Yu-Ao Chen**, Chengkai Zhu, Keming He, Mingrui Jing, and Xin Wang, “Virtual Quantum Markov Chains”, arXiv preprint, arXiv: 2312.02031(2023).
- › Kun Wang, **Yu-Ao Chen**, and Xin Wang, “Mitigating Quantum Errors via Truncated Neumann Series”, Science China Information Sciences 66.8 (2023): 180508.
- › Kun Wang, **Yu-Ao Chen**, and Xin Wang, “Measurement error mitigation via truncated Neumann series”, talk in TQC2021(16th Conference on the Theory of Quantum Computation, Communication and Cryptography), arXiv:2103.13856 (2021).
- › **Yu-Ao Chen**, Xiao-Shan Gao, and Chun-Ming Yuan, “Quantum algorithm for optimization and polynomial system solving over finite field and application to cryptanalysis”, arXiv preprint, arXiv:1802.03856 (2018).
- › **Yu-Ao Chen**, and Xiao-Shan Gao, “Quantum algorithm for Boolean equation solving and quantum algebraic attack on cryptosystems”, Journal of Systems Science and Complexity 35.1 (2022): 373-412.
- › **Yu-Ao Chen**, and Xiao-Shan Gao, “Criteria for Finite Difference Gröbner Bases of Normal Binomial Difference Ideals”, Proceedings of the 2017 ACM on International Symposium on Symbolic and Algebraic Computation, 2017.

Authorized Patents

- › **Yu-Ao Chen** and Lijing Jin, “Method, device and equipment for determining connectivity characteristics and storage medium”, CN114943199B.
- › Lijing Jin and **Yu-Ao Chen**, “Quantum chip structure, determination method, device, equipment and storage medium”, CN114819164B.
- › **Yu-Ao Chen** and Runyao Duan, Digital signature method, signature information verification method, related device and electronic equipment”, CN113407976B.
- › Kun Wang, **Yu-Ao Chen**, and Xin Wang, “Quantum device denoising method and device, electronic device and computer readable medium”, CN113298262B.
- › **Yu-Ao Chen**, Shusen Liu and Ningfeng Wang, “Quantum gate calibration method and device, electronic equipment and medium”, CN113128691B.
- › **Yu-Ao Chen**, Runyao Duan and Lijing Jin, “ Digital signature method, signature information verification method, related device and electronic equipment”, CN113098691B.
- › Kun Wang, **Yu-Ao Chen**, and Xin Wang, “Method and system for eliminating quantum measurement noise, electronic device and medium”, CN113011593B.
- › **Yu-Ao Chen**, Runyao Duan and Lijing Jin, “Digital signature method, signature information verification method, related device and electronic equipment”, CN112560091B.

Public Patents

- › Jingbo Wang, **Yu-Ao Chen** and Shusen Liu, “Quantum random number generation method, device, equipment, system and storage medium”, CN116820401A.
- › Lijing Jin, **Yu-Ao Chen** and Lipeng Chen, “Quantum chip, quantum computer and manufacturing method”, CN116796847A.
- › **Yu-Ao Chen**, “Quantum circuit simulation method, device, equipment and storage medium”, CN116415669A.
- › **Yu-Ao Chen** and Lijing Jin, “ Quantum chip structure and layout generation method thereof”, CN116384496A.
- › **Yu-Ao Chen**, Jianxiao Chen and Shusen Liu, “Method and device for calibrating periodic rotation quantum gate, electronic equipment and medium”, CN115936135A.
- › **Yu-Ao Chen**, “Method, device and equipment for determining processing parameters and storage medium”, CN115829040A.
- › **Yu-Ao Chen**, Wenyun Sun and Shusen Liu, “ Method, device and equipment for determining characteristic information and storage medium”, CN115759269A.
- › Jingbo Wang and **Yu-Ao Chen**, “Quantum gate generation method and device, electronic equipment and medium”, CN115329966A.

- › **Yu-Ao Chen** and Runyao Duan, “Digital signature method, signature information verification method, related device and electronic equipment”, CN113407975A.

Talks

08/2019	Student Conference on Quantum Computing, Pengcheng Laboratory, Shenzhen, China.
05/2019	Quantum Algorithms for Cryptanalysis(invited talk), Workshop co-located with EuroCrypt2019, Darmstadt, Germany.
11/2018	Conference on Chinese Society of Computer Mathematics(CM2018), Wuhan, China.
04/2018	Doctoral Forum, Tsinghua University, Beijing, China
07/2017	The 42nd International Symposium on Symbolic and Algebraic Computation(ISSAC17), University of Kaiserslautern, Kaiserslautern, Germany.
06/2017	Doctoral Forum, Nankai University, Tianjin, China
11/2016	Conference on Chinese Society of Computer Mathematics(CM2016), Shenzhen, China.

Honors and Awards

2021	Technology Innovation Award(Core member of QuantumLeaf), Baidu Inc.
2019	“Aramco Scholarship” Excellence Award, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
2018	Cybersecurity Scholarship, China Internet Development Foundation Cybersecurity Special Fund
2017	Outstanding Student, University of Chinese Academy of Sciences
2016	Excellent student cadres, outstanding Student, University of Chinese Academy of Sciences
2015	Hua Luogeng Mathematics Talent Class Award, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
2014	The Chinese Mathematics Competitions, second prize in Anhui Province
2014	Outstanding Student Silver Award, University of Science and Technology of China
2013	Outstanding Student Bronze Award, University of Science and Technology of China
2010	Chinese High School Mathematics League, second prize in Liaoning Province
2010	Chinese Physics Olympiad, Second Prize in Liaoning Province
2009	Chinese Physics Olympiad, Second Prize in Liaoning Province