

RANYILIU CHEN

Website

<https://cryl.github.io>

Email

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RESEARCH INTEREST

Quantum Information, Quantum Machine Learning, Non-local Games, Operator Algebra.

CAREER

Assistant Researcher

QSCGBA (Quantum Science Center of Guangdong-Hongkong-Macao Greater Bay Area), Shenzhen, China

Since: June 2025

Postdoc

QMATH, University of Copenhagen, Copenhagen, Denmark

Duration: Nov. 2024 - Jan. 2025

EDUCATION

PhD Stipend in Mathematics

QMATH, University of Copenhagen, Copenhagen, Denmark

Supervisor: Prof. Laura Mančinska

Duration: Nov. 2021 - Oct. 2024

PhD thesis: Black-box protocols for certification of quantum devices

In the PhD I focused on several fundamental problems concerning the power and limit of self-testing from a mathematics point of view. I showed how to remove common assumptions in self-testing, identified strategies that are not self-testable, formulated complex self-test that allows complex conjugation, and constructed a family of protocols that can self-test any real projective measurements.

Master of Engineering in Information and Communication Eng.

Beihang University, Beijing, China

Supervisor: Prof. Tao Shang

Duration: Sep. 2017 - Jan. 2020

Bachelor of Engineering in Electronic Information Eng.

Beihang University, Beijing, China

Duration: Sep. 2013 - July 2017

INTERNSHIP

Institute for Quantum Computing, Baidu Research (full-time)

Supervisor: Prof. Xin Wang (now at HKUST)

Beijing, China

Aug. 2020 - Sept. 2021

On scientific research, I focused on topics in near-term algorithms, particularly, parameterized quantum circuits and their trainability. On software development, I contributed to the QIP module of *Paddle Quantum* platform, and developed the first version of the QAPP module of *QCompute*.

PUBLICATIONS All Real Projective Measurements Can be Self-tested

Ranyiliu Chen, Laura Mančinska, Jurij Volčič.

Nature Physics 20, 1642–1647 (2024)

Near-term Efficient Quantum Algorithms for Entanglement Analysis

Ranyiliu Chen, Benchi Zhao, Xin Wang.

Physics Review Applied, 20, 024071 (2023)

Variational quantum algorithms for trace distance and fidelity estimation

Ranyiliu Chen, Zhixin Song, Xuanqiang Zhao, Xin Wang.

Quantum Science & Technology, 7: 015019 (2021)

Maximal device-independent randomness in every dimension

Máté Farkas, Jurij Volčič, Sigurd A. L. Storgaard, **Ranyiliu Chen**, Laura Mančinska
arXiv 2409.18916 (2024), under review

A mathematical foundation of self-testing: lifting common assumptions

Pedro Baptista, **Ranyiliu Chen**, Jędrzej Kaniewski, David Rasmussen Lolck, Laura Mančinska, Thor Gabelgaard Nielsen, Simon Schmidt.
arXiv 2310.12662 (2023), under review

Full quantum one-way function for quantum cryptography

Tao Shang, Yao Tang, **Ranyiliu Chen**, Jianwei Liu.
Quantum Engineering, e32 (2020)

Quantum random oracle model for quantum public-key encryption

Tao Shang, **Ranyiliu Chen**, Qi Lei.
IEEE Access, 7: 130024-130031 (2019)

IND-secure quantum symmetric encryption based on point obfuscation

Ranyiliu Chen, Tao Shang Jianwei Liu.
Quantum Information Processing, 18: 161 (2019)

On the obfuscatability of quantum point functions

Tao Shang, **Ranyiliu Chen**, Jianwei Liu.
Quantum Information Processing, 18: 55 (2019)

Quantum homomorphic signature with repeatable verification

Tao Shang, Zhuang Pei, **Ranyiliu Chen**, Jianwei Liu.
Computers, Materials & Continua, 59(1): 149–165 (2019).

PATENT

量子纠缠量化方法和装置，电子设备，计算机可读介质

CN113361717B, authorized in Sept. 2022

量子噪声信道的逆映射分解方法及装置、电子设备和介质

CN113098803B, authorized in Nov. 2021

量子数据间距离的确定方法及量子设备

CN112633509B, authorized in July 2021

**CONFERENCE
TALKS**

Quantum Information Processing (QIP, Acceptance rate \approx 20%)

Contributed talk, Jan 2024 (Taipei, Taiwan)

Quantum Certification Conference (QUACC)

Long talk, Nov 2023 (Warsaw, Poland)

Theory of Quantum Computation, Communication, and Cryptography (TQC, Acceptance rate \approx 25%)

Contributed talk, July 2023 (Aveiro, Portugal)

Asian Quantum Information Science Conference (AQIS)

Contributed talk, Sept 2021 (online, hosted by U. Tokyo, Japan)

**SEMINAR
TALKS**

Quantum Information Colloquium at Ruhr University Bochum

Apr 2024 (Bochum, Germany)

QUASaR Seminar at University of Ottawa

Feb 2024 ((online) Ottawa, Canada)

QUSOFT Seminar at Centrum Wiskunde & Informatica (CWI)

Feb 2024 (Amsterdam, Netherland)

Analysis Seminar at Harbin Institute of Technology (HIT)

Dec 2023 (Harbin, China)

Quantum Info Seminar at Hong kong Uni. of Science and Technology (HKUST)

Nov 2023 (Hongkong, China)

VERIQTAS Workshop at Center for Theoretical Physics, Polish Academy of Sciences

Jun 2023 (Warsaw, Poland)
QLUNCH at QMATH, University of Copenhagen (UCPH)
Apr 2023 (Copenhagen, Denmark)
Non-local game Seminar at QMATH, University of Copenhagen (UCPH)
Feb 2022 (Copenhagen, Denmark)

**ACADAMIC
VISIT**

Exchange to QUSOFT, CWI

Supervisor: Prof. Maris Ozols
Amsterdam, Netherlands Feb. 2024 - Apr. 2024

We considered zero-error communication vs. entanglement-assisted zero-error communication, and look for channels with a gap between the corresponding two capacities. We showed that G_{24} , the orthogonality graph of the shortest vectors of the Leech lattice, has entanglement-assisted Shannon capacity 4095, while its Shannon capacity is upper-bounded by 2457.

TEACHING

Teaching assistance in Introduction to Quantum Computing (IntroQC)

University of Copenhagen Sept. - Nov. 2022, Sept. - Nov. 2023

A master/senior bachelor course in which I lectured the exercise classes.

Teaching assistance in Master class of quantum entanglement via nonlocal games

University of Copenhagen 15-19 Aug., 2022

A master class in which I helped in Q&A sessions.

SERVICE

Organiser of a Non-local Game Seminar ([link](#)), 2022-2023

Chair for *QUACC 2023*

Reviewer for *QIP 2025, 2024, QTML 2023, AQIS 2021, Quantum*

**SCIENTIFIC
OUTREACH**

Instructor at QMATH booth in KulturNatten 2022