

Guo Zheng

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Education

University of Oxford

2017 - 2021

Master of Physics, St. John's College

- First Class Distinction. Placed top 5% among around 200 physics major students

Research

Yale University, Department of Physics

Apr. 2020 - Aug. 2020

Summer Research Intern, Supervisor: Prof. Steven Girvin

United States

- Simulated the dynamics of one dimensional Hubbard model on multiple coupled oscillator-transmon systems using GRAPE algorithm from optimal control.
- Improved the performance of GRAPE in QuTip through including customized fidelity expressions, arbitrary initial pulse, etc. The fidelity of dynamics simulation increased from around 90% to 99.9%.
- Performed variational methods based on the improved GRAPE algorithm on the half-filled Hubbard model under weak hopping. The variational ground state reached an overlap of 99% with the ground state from diagonalization.

University of Oxford, Department of Physics

Jan. 2020 - Mar. 2020

Undergraduate Researcher, Supervisor: Prof. Alex Lvovsky

United Kingdom

- Assembled from scratch the experiment setup for type I spontaneous parametric down-conversion (SPDC) with β -Barium Borate.
- Demonstrated entanglement and remote state preparation of the down-converted photons through statistically analyzing photon coincidence event counts.
- Reached 0.03 in the ratio of coincidence event counts to single-photon detection counts, which is around 50% higher than past literature. Produced a report and a comprehensive lab manual to convert the experiment to an advanced undergraduate-level teaching lab.

University of California, Berkeley, Department of Physics

Aug. 2019 - Oct. 2019

Summer Research Intern, Supervisor: Prof. Hartmut Haeflner

United States

- Integrated a new readout camera with a low signal-to-noise ratio into the ion-trap setup. Wrote an interface between the camera's C++-based dynamic link library and the Python-based lab code base.
- Modeled the error sources in the state readout process. Compared readout algorithms based on data from segmented photomultiplier tubes to ones based on images from an electron-multiplying charge-coupled device (EM-CCD).

Princeton University, Department of Chemistry

Jun. 2019 - Dec. 2019

International Student Internship Program, Supervisor: Prof. Herschel Rabitz

United States

- Simulated dynamics of one dimensional Ising model under time-dependent transverse and longitudinal fields using Artificial Neural Networks (ANN) models such as Feed Forward Neural Network and Restricted Boltzmann Machine.
- Optimized the fidelity by initializing the parameters with ground states evolved from stochastic reconfiguration. Implemented Metropolis-Hastings algorithm based on Markov chains for stochastic sampling. Demonstrated the polynomial complexity of the ANN models compared to the exponential scaling of conventional numerical methods for up to 10 spins.

Deutsche Bank, Technology Divisions

Apr. 2019

Spring Internship Program

United Kingdom

- Desk shadowed in Data, Global Transaction Banking Technology, and Fixed Income & Currencies divisions. Took part in coding challenges on data analysis and risk estimations.
- Understood the trading process and roles of the front, middle, and back offices through simulated trading in group activities.
- Was offered a position to join in summer 2020 as summer technology intern at the London office after on-site interviews.

iCarbonX, Algorithms Team

Aug. 2018 - Sep. 2018

Summer Intern

China

- Modified Gibbs sampling algorithm for high dimensional combinatorial problems in dietary intake recommendation tasks. Increased performance for 50% in the testing stage while reaching an acceptable run time. The algorithm is now implemented for industrial usage.
- Analyzed periodic patterns in data extracted from online posts related to childcare with methods like FFT, correlation coefficient, etc. Applied NLP algorithms such as TF-IDF algorithm and TextRank algorithm for keywords extraction.

Southern University of Science and Technology, Department of Physics

Jun. 2018 - Jul. 2018

Summer Research Intern, Supervisor: Prof. Yuanzhen Chen

China

- Researched on quantum computing algorithms and presented to the group on Shor's algorithm, Grover's algorithm, and HHL algorithm. Compared state-of-the-art proposals on quantum machine learning to classical machine learning.
- Expanded expressions for the Hamiltonian of transmon entanglements from two transmons to multiple ones and measured the experimental realizability by estimating the magnitude of interactions.

Talks

Quantum many-body dynamics simulation using ANN models

Aug. 2019

Invited Speaker, International Student Internship Program, Princeton University

United States

State-of-the-art experimental realizations of quantum computing

Feb. 2019

Invited Speaker, Physics Student Talks, University of Oxford

United Kingdom

Academic Honor

Caspeid Scholarship, *St. John's College, Oxford, United Kingdom*

2017 - 2020

International Physics Olympiad (IPhO), *Silver Medal, Yogyakarta, Indonesia*

Jul. 2017

United States of America Mathematical Olympiad (USAMO), *Qualifier (Top 260)*

Mar. 2017

International Young Physicists' Tournament (IYPT), *Captain of National Team of Canada*

Jul. 2016

Skills, Activities and Interests

Technical Skills Python, R, Matlab, Java, and C

Sports Table Tennis, Oxford University Team

Basketball, Oxford University Chinese Society Basketball Team

Society Oxford University Strategy Group Digital

Physics Society

Go Society