Xin Zhao

Qualifications Overview

Motivated and adaptable student studying Physics at the University of Waterloo in 4B term, with a minor in Computing. Learned **quantum theory, experimental skills, and programming**. Enthusiastic about exploring new technologies and actively seeking development opportunities. Eager to apply knowledge to projects in **quantum information processing** and **quantum experiment**.

Education

University of Waterloo Waterloo, ON

Bachelor of Science in Physics, Minor in Computing, GPA: 78.74 *Sept. 2022 – Present*

Relevant Coursework: Intro to QIP (PHYS 467), Quantum Theory (PHYS 454), Quantum Mechanics (PHYS 434), Physics Laboratory (PHYS 360A&B), Computational Physics.

Achievements: Received Term Distinction honors for Fall 2022 and Fall 2023.

Shandong Normal University Jinan, CN

Bachelor of Science in Physics *Sept. 2020 – Jun. 2022*

Achievement: Recommended by the university to participate in the collaborative program with the University of Waterloo in 2022.

Projects and Experiments

QA/QAOA in Solving Currency Arbitrage Problem Jun. 2024 – Aug. 2024

Intern

- Learned about Quantum Annealing**(QA)**, Quantum Approximate Optimization Algorithm **(QAOA)**.
- Utilized **D-Wave's Neal** and **IBM's Qiskit** to encode currency arbitrage problem into **Ising model** and applied QA and QAOA.

Review of a Scheme for Quantum Computation with Linear Optics Apr. 2024

Course Project of PHYS 467

- Introduce how **KLM protocol** realized qubits by photons and created quantum gates with **linear optics**.
- Describe the protocol for increasing the probability of success of quantum gates to near-determinism.

Exploration of NMR Jan. 2024

PHYS 360B

- Used an independent **pulsed nuclear magnetic resonance spectrometer** to introduce the principle of pulsed NMR.
- Explored several **pulse (FID, SE and IR) sequences** and measure the T_1, T_2 for several materials.

Exploration of Laser Mar. 2024

PHYS 360B

- Explored the stimulated emission, population inversion, Helium-Neon laser, **laser cavity**, and cavity modes.
- Created a laser cavity and tested its maximum power.

Gamma Ray Spectrum Nov. 2023

PHYS 360A

- Explored gamma-ray spectroscopy and **determined the gamma-ray spectrum of various sources** (Ba^{133},Bi^{207}, *etc.*).
- Discussed the photoelectric effect, Compton effect, pair production, and scintillator detector.

Nuclear Decay and Nuclear Counting Oct. 2023

PHYS 360A

- Explored principles of **nuclear decay** and Geiger counting, measured the **beta decay** of radioactive sources.
- Verified the Gaussian distribution, analyzed statistical count uncertainties, and corrected for detector dead time.

Experience

Internship in Quantum Algorithm Jun. 2024 – Present

Quantum Tech Yangtze River Delta Industrial Innovation Center *Suzhou, CN*

- Engaged in developing and testing quantum algorithms as QAOA for optimization problems.
- Read papers on quantum algorithms in **combinatorial optimization** and proposed improvements.
- For personal project, **applied QA and QAOA** algorithms in currency arbitrage, **designed the Ansatz**, and **wrote the code** which achieved significant results in multi-qubits systems.

Private Physics Tutor Sept. 2023 – Apr. 2024

Tutor *Waterloo, ON*

- Provided personalized tutoring sessions in basics physics (PHYS 112) to first-year Science students.
- Developed study plans for diverse learning styles, leading to improvement in student's future study.

Virtual Physics Oct. 2022 – Present

Member *Homepage Link*

- Developed basic physics simulation programs focusing on **optical reflections**, using **Python**, which can be used to demonstrate physical principles.

Yikia Electronics Students' Club Sept. 2020 – Jun. 2022

Member *Jinan,CN*

- Have fundamental knowledge of electronics, gaining **skills in repairing common electronic devices**.
- Organized and led multiple voluntary repair activities, fixing over 50 electronic items for university community members, fostering a culture of sustainability.

Skills & Interests

Skills: Python, Microsoft Excel, R

Interests: Experimental Physics, Physics Simulation, Quantum Information Processing

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