Jonathan Lau Wei Zhong

Curriculum Vitae

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Professional Summary

Strong interest in modelling systems and phenomena in the real world with mathematical tools. 3 years of experience in the quantum computing field, analyzing near-term quantum algorithms, and working with experimentalists to realize quantum devices for machine learning and sensing. Strengths in research, mathematical modelling, data analysis. Highly accountable and patient, and naturally inquisitive.

Education

Program	Institution	%/CGPA	Year
Ph.D. (Quantum Computing & Information)	Centre for Quantum Technologies, National University of Singapore	**4.8/5**	2020-2024(est.)
B.Sc. Hons (Physics)	National University of Singapore	**4.53/5**	2016-2020
NUS High Diploma	NUS High School of Math and Science	**4.3/5**	2008-2013

Experience

1. *Ph.D. Student/Researcher* **2020 - 2024(est.)**

Centre for Quantum Technologies, National University of Singapore

- Specializing in applications of near-term quantum computers and simulators.
- Formulated multiple research ideas and spearheaded the projects to completion.
- Partnered different experimental groups in the process.
- Coauthored 8 papers.
- Supervised by Professor Kwek Leong Chuan.

2. *Graduate Teaching Assistant* **2021**

National University of Singapore, Department of Physics

- Teaching assistant for an advanced statistical mechanics module, PC4241.
- Taught tutorial sessions for undergraduates.
- Other duties include marking of assignments, and consolidating student scores and feedback.

3. *Undergraduate Teaching Assistant* **2018-2020**

National University of Singapore, School of Computing

- Teaching assistant for undergraduate Computer Science module, CS1010s.
- Taught tutorial sessions for undergraduates.
- Refined the usage of an online forum for the module.
- Other duties include marking of assignments, and various ancillary administrative duties for the module.

Research Focuses

1. *Near-term Quantum Computing* **2020-Current**

- Studying how to construct and analyze quantum algorithms for use on near-term quantum computers. Recent papers:
- NISQ computing: where are we and where do we go?, AAPPS Bulletin, 2022
- NISQ algorithm for hamiltonian simulation via truncated taylor series, SciPost Physics 12 (4), 122, 2022
- Simulating Energy Transfer in Molecular Systems with Digital Quantum Computers, Journal of Chemical Theory and Computation 18 (3), 1347-1358, 2022
- Convex optimization for non-equilibrium steady states on a hybrid quantum processor, Preprint on Arxiv, 2022

- Quantum assisted simulation of time dependent Hamiltonians, Preprint on Arxiv, 2021

2. *Machine Learning on Integrated Photonic Chips* **2020-Current**

- Such platforms have many potential applications, such as in quantum computing. We are exploring alternative uses, like speeding up and efficiently implementing classical machine learning models on such devices. Recent papers:
- A photonic chip-based machine learning approach for the prediction of molecular properties, Preprint on Arxiv, 2022

3. *Atomtronics* **2020-Current**

- Studying transport properties and potential applications of highly tunable cold atom simulators. Recent papers:
- Atomtronic multi-terminal Aharonov-Bohm interferometer, Preprint on Arxiv, 2022

4. *Alternative computational methods for quantum many-body physics* **2018-Current**

- Exploring using methods like Matrix Product States and Density Functional Theory to simulate and probe different kinds of many-body quantum systems. Recent papers:
- Fourth-order leapfrog algorithms for numerical time evolution of classical and quantum systems, Preprint on Arxiv, 2020

Refereed Journals and Conferences

- PRX Quantum
- International Journal of Quantum Information
- Quantum Techniques in Machine Learning 2021
- Quantum Science and Technology
- AVS Quantum Science
- Physical Review A

Technical Skills

- Programming Language: Python, MATLAB
- Machine Learning: Pytorch, Scikit
- Data Analysis: Pandas, Matplotlib
- Office Programs: Latex, Microsoft Office
- Mathematical Programs: Mathematica, Maple
- Mathematical Modelling: NumPy, SciPy
- Mathematical Optimization: CVX
- Operating System: Windows, Linux

Positions of Responsibility

- *Mentor* for Code for Cities 2022, organized by SMU Smarti City Society.
- *Academic Director* of NUS Physics Society (2018-2019).

Workshops and Conferences

- Attended *Atomtronics @ Benasque 2022*.

Miscellaneous Qualifications

- WSET Level 2 Award in Wine (Merit)

Others

- Hobbies: Reading, wine tasting, hiking
- Languages: English

Declaration

I do hereby declare that all the details furnished above are true to the best of my knowledge and belief.

Singapore
Jonathan Lau Wei Zhong
26th September, 2022