Alvin Heng

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Google Scholar

EDUCATION

University of Toronto Sep 2020 - Present
MSc in Physics
Advisor: Nathan Wiebe

Nanyang Technological University Aug 2016 - May 2020
BSc (Hons) in Physics

EXPERIENCE

Graduate Student Researcher Sep 2020 - Present
University of Toronto

- Researching the use of classical machine learning techniques in quantum information processing.
- Investigating how deep learning techniques can be used to improve particle resamplers for Sequential Monte Carlo, with applications to quantum algorithms.

Software Development Intern Jun 2020 - Aug 2020
SpeQtral

- SpeQtral is a satellite-based Quantum Key Distribution company that focuses on developing the hardware needed for secure quantum communications.
- Developed an open source API that distributes quantum keys according to the ETSI standard, and ensured compatibility with commercial encryptors from a partner cybersecurity company.

Undergraduate Researcher Jul 2017 - May 2020
Nanyang Technological University

- Studied the physics of a quantum material using Quantum Monte Carlo simulations.
- Implemented code in Fortran and analyzed data in Python.
- Communicated results in a first author scientific paper.

Visiting Researcher Jun 2019 - Dec 2019
Kavli Institute for Theoretical Physics, UCSB

- Collaborated with experimental physicists on a simulation study of a quantum material.
- Developed simulation code in C++ using open source libraries and analyzed data in Python.
- Communicated results in a co-first author paper.

Summer Intern May 2018 - Aug 2018
Institute of High Performance Computing, A*STAR

- Analyzed the statistical properties of the Bitcoin and Lightning cryptocurrency networks.
- Simulated real-world transactions sampled from the Bitcoin blockchain and proposed a simple fee structure that optimizes Lightning channel imbalances.
- Communicated results in first author conference publication.

PUBLICATIONS

[1] R. L. Dally, **A. J. R. Heng**, A. Keselman, M. Bordelon, M. B. Stone, L. Balents, and S. D. Wilson. Three-Magnon Bound State in the Quasi-One-Dimensional Antiferromagnet α-$NaMnO_2$. *Physical Review Letters* **124**, 197203 (2020).

[2] **A. J. R. Heng**, W. Guo, A. W. Sandvik, and P. Sengupta. Pair hopping in systems of strongly interacting hard-core bosons. *Physical Review B* **100**, 104433 (2019).

[3] **A. H. Jun Ren**, L. Feng, S. A. Cheong, and R. S. Mong Goh. Optimal Fee Structure for Efficient Lightning Networks. *2018 IEEE 24th International Conference on Parallel and Distributed Systems (ICPADS)* (2018) pp. 980-985.

AWARDS

Singapore National Academy of Science Award	2020
CN Yang Scholars Programme	2016 - 2020
Nanyang Scholarship	2016 - 2020
CNYSP Research Award (Gold)	2019
Dean's List	2016/17, 2017/18, 2019/20

SKILLS

Programming: Python, Fortran, C++, C, MATLAB, LaTeX, Git, Unix

Relevant Courses: Algorithms, Data Structures, Object-Oriented Programming, Introduction to Machine Learning, Neural Networks and Deep Learning, Probabilistic Learning and Reasoning, Scientific Computing for Physicists