

# Alvin Heng

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## EDUCATION

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<b>National University of Singapore</b> <i>Ph.D Candidate in Computer Science</i>	2021 - Present
<b>University of Toronto</b> <i>M.Sc in Physics</i>	2020 - 2021
<b>Nanyang Technological University, Singapore</b> <i>B.Sc in Physics</i>	2016 - 2020

## EXPERIENCE

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<b>National University of Singapore</b> <i>Graduate Researcher</i> with Harold Soh	Aug 2021 - Present
Conducting research on safe, robust and efficient deep generative models. Topics explored broadly include gradient flows, diffusion models, variational inference and neural ODEs/SDEs.	
<b>University of Toronto</b> <i>Graduate Researcher</i> with Nathan Wiebe	Sep 2020 - Aug 2021
Worked remotely to investigate how deep learning techniques can be used to improve particle resamplers for Sequential Monte Carlo, with applications to quantum algorithms.	
<b>SpeQtral</b> <i>Software Development Intern</i>	Jun 2020 - Aug 2020
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.	
<b>Nanyang Technological University, Singapore</b> <i>Undergraduate Researcher</i> with Pinaki Sengupta	Jun 2017 - May 2020
Ran Quantum Monte Carlo simulations to study the physics of quantum materials. Published in Physical Review B.	
<b>Kavli Institute for Theoretical Physics, UCSB</b> <i>Visiting Researcher</i> with Anna Keselman, Leon Balents	Jun 2019 - Dec 2019
Collaborated with experimental physicists to run numerical simulations on a quantum material with exotic spin excitations. Published in Physical Review Letters.	
<b>Institute of High Performance Computing, A*STAR</b> <i>Research Intern</i> with Ling Feng	May 2018 - Aug 2018
Analyzed the statistical properties of the Bitcoin and Lightning cryptocurrency networks and ran simulated transactions to investigate the problem of Lightning channel imbalances. Published in ICPADS 2018.	

## SCHOLARSHIPS & AWARDS

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NUS SoC Research Achievement Award	2023
NUS SoC Graduate Tutorship-PhD Scheme	2021 - Present
Singapore National Academy of Science Award	2020
CNYSP Research Award (Gold)	2020

CN Yang Scholars Program  
Nanyang Scholarship  
NTU SPMS Dean's List

2016-2020  
2016-2020  
2016/17, 2017/18, 2019/20

## PUBLICATIONS

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- [7] **Out-of-Distribution Detection with a Single Unconditional Diffusion Model**  
**A. Heng**, A. H. Thiery, H. Soh  
*Preprint*, 2024.
- [6] **Selective Amnesia: A Continual Learning Approach to Forgetting in Deep Generative Models**  
**A. Heng**, H. Soh  
*Neural Information Processing Systems (NeurIPS)*, 2023, **Spotlight** (Top 3.06% of submitted papers).
- [5] **Neural Continuous-Discrete State Space Models for Irregularly-Sampled Time Series**  
A. F. Ansari, **A. Heng**, A. Lim, H. Soh  
*International Conference on Machine Learning (ICML)*, 2023, **Oral** (Top 2.37% of submitted papers).
- [4] **Generative Modeling with Flow-Guided Density Ratio Learning**  
**A. Heng**, A. F. Ansari, H. Soh  
*Preprint*, 2023.
- [3] **Three-Magnon Bound State in the Quasi-One-Dimensional Antiferromagnet  $\alpha$ -NaMnO<sub>2</sub>**  
R. L. Dally\*, **A. Heng\***, A. Keselman, M. M. Bordelon, M. B. Stone, L. Balents, S. D. Wilson  
*Physical Review Letters*, 2020, \*Equal contribution.
- [2] **Pair Hopping in Systems of Strongly Interacting Hard-Core Bosons**  
**A. Heng**, W. Guo, A. W. Sandvik, P. Sengupta  
*Physical Review B*, 2019.
- [1] **Optimal Fee Structure for Efficient Lightning Networks**  
**A. Heng**, L. Feng, S. Cheong, R. Goh  
*International Conference on Parallel and Distributed Systems (ICPADS)*, 2018.

## TEACHING

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<b>CS3244: Machine Learning</b> , National University of Singapore Teaching Assistant with Prof. Xavier Bresson	Spring 2024
<b>CS3264: Foundations of Machine Learning</b> , National University of Singapore Teaching Assistant with Prof. Harold Soh	Fall 2023
<b>CS1010: Programming Methodology</b> , National University of Singapore Teaching Assistant with Prof. Ooi Wei Tsang	Fall 2021, 2022
<b>CS2030S: Programming Methodology II</b> , National University of Singapore Teaching Assistant with Prof. Ooi Wei Tsang	Spring 2022

## OTHERS

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**Academic Service:** Invited Reviewer for ICML 2024  
**Programming Languages:** Python; *familiar with* C/C++, Java, Fortran  
**Deep Learning Frameworks:** PyTorch  
**Typesetting:** L<sup>A</sup>T<sub>E</sub>X