Jian Wei CHEONG

Curriculum Vitae

Professional Qualifications

Doctor of Philosophy, Physics Nanyang Technological University (NTU), Singapore

2019 - 2023

Bachelor of Science, Physics (Honours) Nanyang Technological University (NTU), Singapore

2015 - 2019

Doctor of Philosophy, Physics Nanyang Technological University (NTU), Singapore

Bachelor of Science, Physics (Honours) Nanyang Technological University (NTU), Singapore

Diploma, Electrical Engineering Ngee Ann Polytechnic, Singapore

2019 - 2023

2015 - 2019

2010 - 2013

Professional Appointments

Research Fellow Nanyang Technological University (NTU), Singapore

Project Officer Nanyang Technological University (NTU), Singapore

Teaching Assistant PH3101 Quantum Mechanics 2 PH1199 Physics Lab 1B PH1198 Physics Lab 1A Nanyang Technological University (NTU), Singapore

Intern ST Electronics, Singapore

2024 - current

2023 - 2024

2021 2020 2019

2012

Awards and Achievements

Short-speech Contest Best Presentation PAP701 Graduate seminar module Nanyang Technological University (NTU), Singapore

Dean's List (top 5% of cohort) Nanyang Technological University (NTU), Singapore

NTU President Research Scholar (completing URECA) Nanyang Technological University (NTU), Singapore

Director's List (top 5% of cohort) Ngee Ann Polytechnic, Singapore

Best Performance (top student of cohort) Programmable Logic Device Digital Electronics & Practice Ngee Ann Polytechnic, Singapore

2019

2017/2018

2016/2017

2011

2011 2010

List of Publications

1. J. W. Cheong, A. Pradana, and L. Y. Chew, **Non-Markovian refrigeration and heat flow in the quantum switch**, Physical Review A, 110(2), 022220 (2024).
2. L. Y. Chew, A. Pradana, L. He, and J. W. Cheong, **Stochastic thermodynamics of finite-tape information ratchet**, European Physical Journal Special Topics (2023).
3. J. W. Cheong, A. Pradana, and L. Y. Chew, **Effects of non-Markovianity on daemonic ergotropy in the quantum switch**, Physical Review A, 108(1), 012201 (2023).
4. L. He, J. W. Cheong, A. Pradana, and L. Y. Chew, **Effects of correlation in an information ratchet with finite tape**, Physical Review E, 107(2), 024130 (2023).
5. J. W. Cheong, A. Pradana, and L. Y. Chew, **Communication advantage of quantum compositions of channels from non-Markovianity**, Physical Review A, 106(5), 052410 (2022).
6. L. He, A. Pradana, J. W. Cheong, and L. Y. Chew, **Information processing second law for an information ratchet with finite tape**, Physical Review E, 105(5), 054131 (2022).

Research Experience

Effects of non-Markovianity in quantum compositions of quantum channels with indefinite causal order Analytical and numerical studies of quantum channel compositions that utilizes coherent superposition, non-Markovianity, and indefinite causal order.

Information ratchet system as a Maxwell's demon for work production Analytical and numerical studies of an information ratchet system that utilizes an information reservoir for thermodynamic tasks.

Characterization of quantum wavefunctions in a tight-binding lattice *Undergraduate Research Experience in CAmpus (URECA), NTU* Numerical study of the conductance fluctuations in the SSH and Haldane models. Simulate electron transports across the 1D SSH chain and the 2D honeycomb lattice of the Haldane model.

Technical Experience

Computer languages Python, Julia, R, C, C++, MATLAB, Haskell, Racket, LaTeX, Typst, HTML, CSS, bash, POSIX sh

Miscellaneous software Blender, Arduino, Google Sketchup, Autodesk Fusion360, Autodesk AutoCAD, Autodesk EAGLE, Origin Pro, National Instruments LabVIEW

Miscellaneous projects

Strain estimation for hazard forecastings before and after 2011 Japan Tohoku earthquake *ES7008 Geophysical Data Analysis, NTU* Analyzed seismic GPS displacement data in Python. Estimated seismic strains with velocity fields using Delaunay triangulation. Demonstrated correlations between earthquake event hotspots and strain hotspots, before and after Tohoku earthquake.

Variations in statistical complexity of genome sequences across species *CE7412 Computational and Systems Biology, NTU* Analyzed genome sequences of human, chimpanzee, rhesus macaque, dog, and fruit fly, from GenBank assembly in R. Applied the Baum-Welch algorithm and Akaike information criterion to compute the average statistical complexity of their genomes. Suggested that increased biological complexity corresponds to decreased statistical complexity in genomes.

Detecting adversarial attack of deep neural networks for image recognition from image complexity *PH3502 Chaotic Dynamical Systems, NTU* Trained image recognition deep neural networks with MNIST, Fashion-MNIST, and CIFAR10 datasets in Python. Applied adversarial attacks such as Fast Gradiant Sign Method (FGSM), DeepFool, One Pixel Attack, Jacobian-Based Saliency Map Attack (JSMA). Showed that FGSM and DeepFool can be detected from its increased image complexity.

Monte Carlo photon transport in multi-layered biological tissues *PH4505 Computational Physics, NTU* Simulated photon transports in biological tissues by means of random walk in Python. Demonstrated the applications of computational methods on medical areas such as biomedical imaging and photon therapy.

Monte Carlo simulation of periodic-driven Brownian particles *PAP723 Numerical Methods for Physicists, NTU* Simulated 2D toy model of attractive Brownian particles that obeys the Arrhenius equation for the formation and destruction of bonds. Demonstrated that the system tends to configurations that result in increased entropy production when driven with a periodic driving force.

Designing, programming, 3D printing, and building a hovering quadcopter drone *Making and Tinkering Lite 1, NTU* Programmed a Arduino microcontroller. Designed printed circuit board (PCB) in Autodesk EAGLE. Designed and 3D printed drone in Autodesk Fusion360. Simulated physical system in COMSOL Multiphysics.