

DING RUIQI

Physics Undergraduate Student

@ e0134117@u.nus.edu

📍 Singapore

🔗 <https://tesla-cat.github.io>

🔗 <https://github.com/tesla-cat>

EXPERIENCE

Apprentice

Dzmitry Matsukevich Group - CQT

📅 2018 – Present

📍 CQT, Singapore

- Using Cyclone V SoC FPGA Device to control optical devices for Ion Trap Quantum Computing
- Making circuit boards for laser system
- Building laser for Ion Trap system

Undergraduate Researcher

Berge Englert Group - CQT

📅 2018

📍 CQT, Singapore

- Write Matlab code to implement new approximations to Time Dependent Shrodinger Equation, specifically the simulation of Stern-Gerlach interferometer

EDUCATION

Bachelor of Science

National University of Singapore

📅 June 2016 – present

📍 Singapore

Bachelor of Science (Taking Master Modules)

University of Gottingen

📅 April 2019 – August 2019

📍 Germany

ACHIEVEMENTS

- PhD indicates PhD modules and MSc indicates Master modules
- Grades (NUS Standard) related to Quantum Mechanics

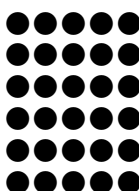
Linear Algebra II	A
Quantum Mechanics I	A
Quantum Mechanics II	A
Quantum Optics	A
(PhD) Quantum Information and Computation	A-

- Grades (German Standard) related to Biophysics

(MSc) Research Seminar Biophysics	1.7
(MSc) Advanced Topics in Biophysics	1.0
(MSc) Biomolecular Physics and Simulations	1.3
(MSc) Biophysics of gene regulation	2.0

SKILLS

Python, PyTorch
Javascript, NodeJS
C++, Arduino
Verilog, Quartus
Altium Designer
IoT, ESP32



HONORS & AWARDS

- SM2 Scholarship from Singapore Government (90 recipients from China per year)
- Science & Technology Undergraduate Scholarship from NUS

PROJECTS

Note: The following can all be found in <https://tesla-cat.github.io/Simple-Physics>

Density Functional Theory

- This is a my final year project advised by Prof Berge Englert at CQT, the aim is investigate density functional theory in momentum space
- I would also like to explore using state of art Machine Learning architectures in DFT, as several successful cases have been published

Simple Physics Documentation

- Documentation of my Study Notes/ Paper Summary/ Research Progress in a simple way
- Also aims to serve education purpose to the public, just like W3Schools

Note: The following can all be found in <https://github.com/tesla-cat>

FPGA ESP32 Tesla Coil

- The goal is to develop a musical Tesla Coil using most advanced technology: IoT and FPGA
- Part 1: Use ESP32 to build a web and web-socket server, it handles MIDI files uploaded by the client, parse it to analyze physical value such as frequency and volume. It then sends serial signal as well as PWM waveform to control the FPGA
- Part 2: The FPGA picks up feedback signal, handles logic such as controlled phase shifting, then produces signals to drive IGBT
- Part 3: The IGBT gate signal is two-stage amplified using custom circuit and custom designed PCB. The amplified signal than drives Tesla Coil to produce music

Dzmitry Matsukevich Group

- Current work: Using Cyclone V SoC FPGA Device to control optical devices for Ion Trap Quantum Computing

Nanobot in Complex Flow

- This is a cutting edge research project initiated by the module Advanced Topics in Biophysics
- The aim is for Nanobots to learn to navigate in non-observable environments such as human tissue
- The method is to use Reinforcement learning. The fluid environment is simulated and a corresponding Markovian transition matrix is calculated. The nanobots then undergoes random walks determined by this Markov matrix