Dowling Wong

Dowling's website https://github.com/Dowling7 dowlingwong@brandeis.edu

Education

Brandeis University May 2024
Bachelor of Science in Physics *GPA: 3.73/4.00*

Franklin W. Olin College of Engineering May 2024
ABET Accreditation degree in Electrical and Computer Engineering *GPA: 3.89/4.00*

Research

Particle Identification Algorithm | *Brandeis/MIT* Mar 2022 – Present
Advisor: Aram Apyan, Philip Harris

- Developing Particle Identification Algorithm for DarkQuest Proposal
- Track Reconstruction using drift chambers, EM-calorimeter, and hodoscope
- Developing of Seed-Cone clsutering Algorithm on EMCal
- Constructed an optimized python package for DarkQuest data analysis, machine learning kit, plotting tools, and CSV saving tools

Holographic Duality and Entanglement Entropy| *Brandeis* Nov 2022 – Aug 2023
Instructor: Matthew Headrick

- Backgound reading mainly focuses on Tensor Network, and Entanglement Entropy
- Independent learning note on solutions of Einstein Field Equations, derivation of some basic AdS/CFT correspondece

Talks and Presentations

Update on Particle ID and Simulation at DarkQuest Collaboration(Talk) Aug 2023
D. Wong *and W.P.McCormack*

DarkQuest Collaboration All-Hands on Workshop, Boston(Talk) Oct 2023
W.P.McCormack, N.Paladino, E.Scheuller, ***D. Wong***

SeedCone Clustering, Displaced Vertexing and Track Reconstrction

Brandeis SciFest XII(Presentation) Aug 2023
A.Apyan, P.C.Harris, W.P.McCormack, ***D. Wong***

Neural Network on Particle Identification, Cut-based and NN-based particle discriminator

Experience

Visiting Student | *MIT LNS* Jun 2023– Present
Visiting student to Philip Harris group to conduct further research on NN-based Particle ID and Clustering Algorithm. Learn about DataScience applications in Physics.

Research Assistant, member of Brandeis HEP | *Brandeis university* Jun 2022 – Present
Advised by Prof.Aram Apyan. Doing research on displaced vertexing, tracking reconstruction and particle identification for DarkQuest Collaboration.

Student | *Brandeis Quantum and Gravitational Theory Group* Nov 2022 - Aug 2023
Reading papers on Quantum gravity, derive Bulk-Boundary relationship start from solving Einstein Equation. Reading about Tensor Network prepare for senior thesis.

Visiting student | *Fermi National Accelerator Laboratory* Mar 2022 – Present
Member of DarkQuest Collaboration, modify Pythia 8 to construct simulation for proposal.

Technician | *Brandeis ITS* Sep 2021 - Mar 2022
Computer hardware, customer service.

Skills

Languages: C/C++, Java, Python, Mathematica, MatLab, HTML/CSS, LaTeX, MricoPython, CircuitPython
Tools: Vim, Git/GitHub, zsh, Bash, VS Code, IntelliJ IDEA, Jupyter Notebook
Machine Learning Packages: PyTorch, Tensorflow, Keras

Selected Courses

CAS PY 501 Mathematical Physics | *Boston University* FA 2023

PHYS 91G Introduction to Research Practice | *Brandeis University* SP 2022

PHYS 99D Senior Research | *Brandeis University* FA 2023

PHYS 164A First Year Tutorial I | *Brandeis University* FA 2023

PHYS 163A Statistical Physics and Thermodynamics | *Brandeis University* FA 2023

PHYS 162B Quantum Mechanics II | *Brandeis University* SP 2023

PHYS 161A Electromagnetic Theory I | *Brandeis University* FA 2023

PHYS 111A Physical Continuum Mechanics | *Brandeis University* SP 2022

PHYS 102A General Relativity | *Brandeis University* SP 2023

PHYS 39A Advanced Physics Laboratory | *Brandeis University* FA 2022

PHYS 31A Quantum Theory I | *Brandeis University* SP 2022

PHYS 31B Quantum Theory II | *Brandeis University* FA 2022

PHYS 30A Electromagnetism | *Brandeis University* FA 2021

PHYS 29A Electronics Laboratory I | *Brandeis University* SP 2022

MATH 125A Mathematics for Machine Learning | *Brandeis University* FA 2023

MATH 102A Introduction to Differential geometry | *Brandeis University* SP 2023

MATH 37A Differential Equations | *Brandeis University* SU 2022

COSI 12B Advanced Programming Techniques in Java | *Brandeis University* SU 2022

ENGR 3390 Fundamentals of Robotics | *Olin College* SP 2023

ENGR 3430 Eclectronics | *Olin College* FA 2022

ENGR 2110 Principles of Integrated Engineering | *Olin College* FA 2022

ENGR 3499A Special Topics in Electrical & Computer Engineering : Satellite Systems | *Olin College* SP 2023

Electronic Projects

PE6502 8bit computer | *Assembly Language, PCB hand soldering* Aug 2023 – Present

- PCB design based on MOS 6502 datasheet and Ben Eater website.
- Hand soldering components and testing.

Autopilot Robot Rover | *Computer Vision, Robotic Control System, Matlab, Git* May 2023

- Developed an autopilot with AprilTag, accelerometer and GPS, following trail around Olin Oval. With real-time video sending back and human control system
- Design mechanical structure and electrical system, have low-volt control system and high-volt actuation system.
- Computer Vision for color block and PID control to walk through bridge
- Constructed website to summarize project and share code.

Digital Camera based on RP2040 | *OS develop, PCB design and soldering, SPI interface* Dec 2022

- Made prototype with Dowling Pi Pico, tested with breadboard
- Wrote a camera operating system using circuitpython and micropython
- PCB designed based on Dowling Pi Pico layout, added camera and SD card slot with IOs and buttons.
- Reflow oven soldering and hand solder fixed

Dowling Pi Pico | *PCB design and soldering, RP 2040* Dec 2022

- Design circuit following RP2040 processor manual, draw scheme for circuit.
- PCB design for layout, replace micro-USB to USB-C port.
- Reflow oven soldering with hand soldering fixed.