

## EDUCATION

### MSci Physics with Theoretical Physics, Imperial College London

2017 – 2022

Overall Mark: **67.3%**

Year 1: **69.1%** | Year 2: **68.9%** | Year 3: **69.0%** | Year 4: **64.7%**

### Cardinal Newman College

2015 – 2017

Mathematics: **A\*** | Chemistry: **A\*** | Physics: **A**

## BACKGROUND

### Mathematics

- Studied in a field that requires a very high mathematical foundation, and have applied this in theoretical physics modules.
- Have taken several modules (e.g. Differential Equations, Mathematical Methods) in mathematical techniques, giving me the confidence to derive a set of differential equations to describe a system and solve them using a variety of techniques, both analytically and numerically.
- Have taken several modules in statistical methods and applied these to various laboratory and computational projects (discussed below). Used this for data analysis and data visualisation.

### General Problem-Solving

- General requirement of a high degree of problem-solving and lateral thinking.
- Third year *Comprehensives* module covered all content in first and second year, with a focus on problem-solving and bringing together several distinct areas of physics.

## RELEVANT EXPERIENCE

### Masters Project

Oct 2021 – May 2022

*Supervised by Dr Jonathan R Pritchard, Imperial College London*

- Used Python to model galaxy luminosity density using abundance-matching techniques and a feedback-regulated model of star-formation.
- Used data engineering to compile large astronomical data so that they could be used efficiently to calibrate the model to existing data using Bayesian inference techniques.
- Extrapolated the model forward to higher redshifts to make predictions of future surveys such as with JWST.

### Computational Physics Module (Python)

Oct 2018 – Jan 2019

- Theory and implementation of common algorithms used in physics, and projects: matrix methods, interpolation, Fourier transforms, RNG and Monte Carlo methods, function min/maximisation, finite differences for solving PDEs and numerical integration.
- Project on modelling neutrino oscillation by comparing several methods of likelihood maximisation.

### Statistical Mechanics Project: *Complexity and Networks* (Python)

Jan 2020 – Mar 2020

- Implemented the Oslo Model using Python OOP to investigate and visualise the scaling functions of complex systems. Also demonstrated creative methods to increase efficiency of the implementation.
- Used the *NetworkX* Python package to investigate the statistical mechanics of growing basic networks and comparing to results derived from theory.

### Summer Research Internship

July 2019 – Sep 2019

*Supervised by Professor Zulfikar Najmudin, John Adams Institute for Accelerator Science, Imperial College London*

- Convergence-tested *FBPIC* code used to simulate plasma interactions with laser beams for experiments at the Central Laser Facility. Presented findings using Python data visualisation tools.
- Submitted batch jobs to the Imperial College HPC service using Bash scripting, SFTP, and SSH protocols.

### Thermodynamics Computing Lab

Jan 2019 – Feb 2019

- Used Python OOP to simulate a container of gas molecules to investigate the resulting thermodynamics. Required rigorous testing and data visualisation.

### First Year Computing Demonstrator

Oct 2021 – Nov 2021

- Taught fundamental Python skills to first year physics students using Jupyter Notebooks. Enjoyed thinking of unusual scenarios and interesting solutions to instructive problems.

References and transcript available upon request