

Profile

I am a current third-year MPhys student at Oxford University, interested in pursuing a career in particle physics. Studying particle physics and having worked with the particle physics department at STFC as a summer student has given me a strong interest in this area, and I aim to undertake a PhD in the field following the completion of my degree.

Skills

- Data analysis with ROOT
- Python (including for data analysis), C++, MATLAB, Bash, and using Linux
- Simulation tools: Elmer FEM, Gmsh, Garfield++, Magboltz
- Parallel computing (HTCondor) and version control (Git)
- Communication: presentation, report writing, teaching

Projects

Detailed information, including reports, presentations and further projects can be found at tomszwarczer.github.io

Dark Matter Summer Placement | 2024

- Eight-week internship with the particle physics department at STFC
- Simulation of electron interactions leading to scintillation light production in GEM based gas detectors
- Developed skills in C++, data analysis, parallel computing, bash
- Garfield++ used to simulate electron interactions in the presence of gas (Magboltz) and E-fields (Elmer FEM)
- ROOT used for data analysis and to interface with Garfield++
- Regularly presented my progress to the collaboration and assembled a project report

Third year mini project | 2024

- Extended astrophysics practical project, processing observational images including data reduction. By fitting isochrones to processed data, the age, distance, and extinction parameters for stellar clusters were obtained
- Results presented in a scientific report which received a score of 85*

*This mark was given off the record as the project was completed shortly before I suspended my third year of studies for medical reasons. It is therefore not reported on the official transcript. I have since resumed my studies.

Simulation projects | 2024

Simulation of N bodies interacting under gravity: written in Python, using Verlet integration. Supports an arbitrary number of bodies with user-defined masses and initial positions/velocities. Outputs a GIF of the results

1D finite difference time domain (FDTD) simulation of EM waves: Written in Python and C++. Simulates the propagation, reflection and transmission of EM waves in the presence of dielectrics. Outputs a GIF of the results

Comprehensive QM and linear algebra summaries | 2022, 2023

- Compiled extensive LaTeX formatted notes on quantum mechanics and linear algebra, distributed to 1st and 2nd year students
- Developed communication skills and deepened my own understanding in these areas

Education

Oriel College, University of Oxford (Physics MPhys) | 2021-2026

- Scholarship awarded - prize for 2nd year exam performance, overall score of 73
- Prizes awarded for performance in all internal college exams to date
- Scored 98 in 2nd year practical component

Kenilworth School and Sixth Form | 2014-2021

- A*A*A* (Maths, Further Maths, Physics) A-Level
- 99999999A*A*777 GCSE (A^ = A* with distinction)

Employment

- Private tutoring (GCSE & A-Level maths), service staff (Unitemps, Warwick Castle, Wroxall Abbey Hotel)