Tom Szwarcer
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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 tomszwarcer.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.
• Progress was also shared with Florian Brunbauer of the CERN GDD group in weekly meetings

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. Capability to track energy and momentum conservation.
• Developed skills in numerical methods for simulating synamical systems, NumPy, and general programming practices, including writing vector-based code

1D Finite-Fifference 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.

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.
• Literature search carried out
• Results presented in a scientific report

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)

Personal

• Spanish speaker
• Interest in music (guitar/bass/drums): performance and songwriting
• Sports: running, football, squash