Daniel Keerie

Fourth year Physics with Astrophysics MSci at the University of Glasgow, Scotland

daniel@keerie.co.uk | +44 7507 372870 | dakeerie

Education

University of Glasgow GPA 20.3 A3 **Sep 2021 – Present**

Third year:

- High Energy Astrophysics A1
- Quantum Mechanics A1
- Mathematical Methods A1
- Circuits & Systems A1
- Astronomy Lab Project B1
- Stellar Structure & Evolution A1
- Electromagnetic Theory I A1
- Waves & Diffraction A1
- Physics Labs A5
- Thermal Physics B3

Second year:

- Astronomy 2 Best Student Prize
- Astronomy 2 Best Lab Grade Prize
- Physics A2, Astronomy A2, Maths A4

First year:

- Physics A2, Astronomy A3, Maths A3

James Gillespie's High School, Edinburgh **Aug 2015 – May 2021**

- SQA Advanced Highers: Physics A, Mathematics A, Chemistry A, Biology A
- SQA Highers: Physics A, Mathematics A, Chemistry A, Biology A, English A

Employment

EPSRC Vacation Intern

University of Glasgow Jun 2024 – August 2024

I spent ten weeks working on a quantum Bell-type chirality measurement system, in collaboration with Dr Restuccia and Dr Knapper of the University of Glasgow Quantum Optics group. Over the ten weeks, I aligned a quantum optic system which produced polarisation and position entangled photons via an SPDC process using a 'sandwich' BBO crystal. Alongside my lab work, I undertook a literature review on the topic of Bell-type experiments and quantum optic techniques. I was also introduced to 3D printing through the design and manufacture of optical mounts for a pair of single photon avalanche detectors. I used LabView, Python, OPENSCAD and Mendeley reference manager to support various aspects of my work. Additionally, I contributed to weekly Quantum Optics group meetings throughout the duration of the project. The internship culminated in a 10 minute presentation of my work to the group and at a conference with the other EPSRC vacation interns at the university. More recently, I presented my findings at the '7 Minutes of Science' conference hosted by the University of Glasgow Physics Society in February 2025.

Treasurer

University of Glasgow Physics Society (member since Sep 2021) Sep 2024 – Present

Play Worker

Sciennes After School Care Scheme, Edinburgh Dec 2019 – Dec 2023

I worked in a team to organise and oversee various activities for children at a local after school club which

also provided full-time childcare over the school holidays. During the holiday-periods, I was tasked with supervising a small group of children during day trips to local attractions, ensuring they remained safe and happy throughout the day. In addition to this, I was frequently tasked with formulation of indoor and outdoor activities and monitoring which children were at the toilet, a club or other locations in the interest of fire safety. Through teamwork and interaction with parents, teachers, staff and children I developed my personal skills, often in a high pressure environment. Furthermore, I had to follow strict guidelines while working during the COVID-19 pandemic which further enhanced my soft skills.

Projects

Observations of Gradual Solar Energetic Particle Events Literature Review

I spent a semester building a literature-based understanding of solar energetic particle (SEP) events, supervised by Professor Kontar of the University of Glasgow Astronomy and Astrophysics group, in order to write a twenty-page literature review. I chose to write my review on observations of gradual SEP events with a focus on the observable properties of these energetic phenomena and how they are observed in space, specifically using multiple space-craft. Using a variety of sources, I learned about diffusive shock acceleration, particle reservoirs and the streaming limit characteristic of gradual SEP events. I enjoyed this project as I was able to delve deeper into a topic that intrigues me, choosing my own path of research into the areas of SEP physics that I wished to learn about. I am eager to continue my research in solar physics and SEP events.

N-Body Solar System Simulation

For my third year Astronomy Lab Project I spent ten weeks developing an N-body solar system simulation in Python, initially using Newtonian gravity then later applying a relativistic correction. I investigated the conserved quantities of angular momentum and total mechanical energy and compared by simulation to NASA Horizons Ephemeris to determine how close my simulation was to reality. I then simulated idealised Hohmann transfer orbits (HTOs) to determine whether HTOs could have been used by Pioneer 10 to complete its trajectory between Earth, Jupiter and the outer Solar System and compared these simulations to the actual Pioneer 10 trajectory. The project concluded with a ten-page scientific write-up of my method and findings. I thoroughly enjoyed this coding project and its applications to a physical scenario. I hope to work on similar projects in the future.

Skills

Programming	Experienced in Python Physics and Astronomy laboratory work has honed my skills in Python and fostered an interest in computational analysis throughout my university career. The three dimensional N-body solar system simulation was the most challenging coding project I have tackled. I made use of multi-dimensional arrays, various libraries, including Astropy, and different numerical solvers to meet the project objectives. Outside of university I have completed an 'AI Python for Beginners' course hosted by DeepLearning.AI and created a script which plots the electron orbitals of the Hydrogen atom when given the corresponding quantum numbers.
Scientific Reading and Writing	Proficient use of LaTeX, Zotero reference manager, NASA ADS and arXiv