

# Daniel Keerie CV

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

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## EDUCATION

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### University of Glasgow (UofG) GPA 20.4/22 A3

Sep 2021 – Present

#### Fourth year:

- General Relativity & Gravitation A1
- Quantum Theory A1
- Particle Physics A1
- Mathematical Methods II A3
- General Physics Workshop A5
- Cosmology A1
- Atomic Systems A1
- Instrumentation for Optical & Radio Astronomy A1
- Literature Review Project A3
- Solid State Physics C3

#### Third year:

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

#### Second year:

- Physics A2, Astronomy A2, Maths A4

#### First year:

- Physics A2, Astronomy A3, Maths A3

## HONOURS AND AWARDS

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- Astronomy 2 **Best Student** Prize 2022-23
- Astronomy 2 **Best Lab** Prize 2022-23
- UofG Bronze Volunteering Award 2024

## RESEARCH AND PROJECTS

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### MSci Project: Using PINNs to solve Black Hole Perturbations

Sep 2025 - Present

My current research focuses on solving black hole perturbations using physics-informed neural networks (PINNs) supervised by Dr. John Veitch & Dr. Chris Messenger of the Institute of Gravitational Research. The project aims to compute the quasi-normal modes (QNMs) and grey-body factor of a Schwarzschild black hole using PINNs and compare the results to those obtained using more typical numerical techniques. The stretch goal of the project is to calculate the QNMs of a Kerr black hole and investigate the effect of varying the black hole mass and spin on the QNM spectrum in order to verify the no-hair theorem. All code for this project is being implemented using Python. Developing my theoretical understanding of black holes and applying what I learn through code excites me and this project is by far my favourite aspect of my MSci degree.

### Relativity Self-Study GitHub Repository - [Link](#)

Jun 2025 - Present

I created a GitHub repository which hosts various special and general relativity projects in Python. I did this to revise key parts of general relativity, particularly those concerning black holes and gravitational waves, and apply my coding skills in a general relativity context. This self-driven project helped me inform my decision on what topic I wanted to do my MSci project on.

## **Parker Solar Wind Project - [Link](#)**

Jul 2025

Worked on a short, informal project studying the Parker solar wind equation with Professor Eduard Kontar of the UofG Astronomy & Astrophysics group. Through this project I learned about solar wind physics and implemented the RK4 method to numerically solve an ODE with a singularity.

## **EPSRC Vacation Internship**

Jun 2024 - Aug 2024

Worked on a quantum Bell-type chirality measurement system, in collaboration with Dr Restuccia and Dr Knapper of the UofG Optics group. I aligned an optical system to produce entangled photons via a spontaneous parametric down-conversion process and characterised the degree of entanglement. Additionally, I wrote a short literature review on Bell-type experiments and quantum optic techniques and contributed to weekly Optics group meetings. The internship culminated in a presentation to the Optics group and at a UofG vacation internship conference. I also presented my work at the '7 Minutes of Science' conference hosted by the UofG Physics Society in February 2025. The internship was a great, well-rounded first experience of research and solidified my interest in pursuing a PhD and career in academia.

## **N-Body Solar System Simulation - [Link](#)**

Jan 2024 - Apr 2024

Using Python, I developed an N-body solar system simulation for my third year Astronomy lab project. I used the Astropy library to access NASA Horizons ephemeris for initial positions and velocities of Solar System bodies and Scipy solve\_ivp to solve equations of motion. I added a GR correction term and tracked the time evolution of conserved quantities to investigate simulation stability. I then applied my simulation to investigate Hohmann transfer orbits and their potential application in replicating the Pioneer 10 mission. I thoroughly enjoyed gaining new coding skills and the freedom to choose the direction of this project.

# **EMPLOYMENT**

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## **Treasurer**

University of Glasgow Physics Society (committee member since Apr 2022)

Sep 2024 – Present

As treasurer my main job is to ensure society events are budgeted and paid for appropriately. Over the years I've taken a leading role on the committee, organising events including the annual '7 Minutes of Science' conference, a bowling night and charity ceilidhs in aid of Glasgow Women's Aid. I've also been in charge of budgeting, ticketing and paying for larger events such as the annual UofG Science Ball which had over 500 guests in 2025. I co-operate well with other committee members and have made good friends through my work with PhySoc and other societies on campus. Being a part of the PhySoc committee has been incredibly rewarding and has allowed me to develop my ability to speak publicly and communicate my ideas to others.

## **Institute of Physics Campus Ambassador**

University of Glasgow

Sep 2025 – Present

My roles as IOP campus ambassador and Physics Society treasurer work well together. I'm able to engage UofG Physics students via PhySoc social channels and host IOP events through PhySoc. As campus ambassador, my role is to host career-related events designed to inform students of the resources the IOP has on offer. So far, I've hosted Python and LaTeX tutorials and an informal internship workshop in which lower year students could ask fifth year students, myself included, for advice on securing an internship.

## **Trading Assistant**

Sainsbury's Supermarket, Cameron Toll, Edinburgh

Jun 2025 – Present

## **Play Worker**

Sciennes After School Care Scheme, Edinburgh

Dec 2019 – Dec 2023