Deniz Akansoy

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Education

University of Cambridge *Oct 2025 – Present*
PhD in Theoretical Astrophysics

- Astrophysical Fluid Dynamics (AFD) Group, Department of Applied Maths and Theoretical Physics
- Fully funded by the **Science and Technology Facilities Council** Studentship (3.5 Years)

University of Cambridge *Oct 2024 – July 2025*
MPhil in Data Intensive Science (Department of Physics)

- **MPhil Project:** DebrisPy - A Python Package to Compute the Surface Density of Debris Discs
- **Supervisor:** Prof. Roman Rafikov
- Graduated with Distinction

Imperial College London *Oct 2020 – June 2024*
MSci in Physics

- **Master's Thesis:** Radiative Transfer in Protoplanetary Discs: Constraining Planet Induced Shadows
- **Supervisors:** Dr. Anna Penzlin & Dr. Giulia Ballabio
- Graduated with First Class Honours

Publications

1. **D. Akansoy**, H. C. Petrou, A. B. T. Penzlin, & G. Ballabio. **June 2025**. *Modelling Shadows in Scattered Light Observations as Signals from Companions in Protoplanetary Discs.* doi:10.1093/mnras/staf925

Research Experience

Radial Profiles of Debris Discs *Dec 2024 – July 2025*
MPhil Project at DAMTP, University of Cambridge

- Developed *DebrisPy*, an open-access Python package for semi-analytical modeling of the azimuthally averaged surface density of debris discs.
- Implemented analytic formalism from Rafikov (2023) and extended functionality with Monte Carlo sampling in 1D and 2D for independent verification.
- Applied object-oriented programming principles to design a versatile tool for astrophysical applications.
- Released the package to the scientific community with full documentation and reproducibility in mind.

Radiative Transfer in Protoplanetary Discs *Sep 2023 – Dec 2024*
Master's Thesis and Extended Research at Imperial College London

- Investigated scattered light signatures of protoplanetary discs with embedded companions that cast shadows on the disc surface.
- Used an analytic, flared disc model comprised of dust and gas, with an embedded companion at the midplane, and a companion-induced axisymmetric gap.
- Generated synthetic scattered-light observations at micron wavelengths to probe disc surface layers via dust scattering using RADMC-3D.
- Analysed simulations to determine empirical relations linking shadow morphology to companion properties, providing a predictive framework for observations.
- Work resulted in a first-author publication in the *Monthly Notices of the Royal Astronomical Society* (2025).

Research Software

DebrisPy *GitHub*

- Open-source Python package for astrophysical disc modeling (semi-analytic formalism to determine the radial profiles of debris disc surface density).
- Implements advanced numerical techniques: adaptive Gauss–Legendre integration, curvature-based refinement, semi/unstructured adaptive grids, and rejection sampling in 1D and 2D Monte Carlo modules.
- Parallelised across multiple CPUs for efficiency on large-scale computations (numerical integration schemes).
- Built with modular, object-oriented design and released with automated documentation, example notebooks, and testing framework for reproducibility and community use.

Awards & Scholarships

- STFC Studentship - 3.5 year fully funded PhD scholarship, DAMTP, University of Cambridge (2025–2029).
- Johnston Prize for Postgraduate Studies - Hughes Hall, University of Cambridge (2025).
- Summer Project Prize (3rd place) - Department of Physics, Imperial College London (2021).
- EU Scholarship Programme for the Turkish Cypriot Community (1st place nationwide) - funded first two years of undergraduate study (2020–2022).

Work Experience

Student Researcher *Jun 2024 – Jan 2025*
Department of Physics (Astrophysics Group), Imperial College London

- Extended the research from my master's thesis on radiative transfer in protoplanetary discs.
- See Research Experience section for details.

Physics Laboratory Demonstrator *Oct 2023 – Dec 2023*
Department of Physics, Imperial College London

- Demonstrator in First Year Laboratories during the Autumn term of the 2023-24 academic year.
- Assisted in setting up and demonstrating in the interferometry and optics labs.
- Helped new students with coding and data analysis in Python.

Technical Skills

Programming Languages: Python, C++, Bash, LaTeX.

Libraries: NumPy, SciPy, Pandas, Scikit-learn, Tensorflow, JAX, AstroPy, etc.

Software & Tools: Git, SSH, Jupyter, HPC (High-Performance Computing) for data-intensive tasks.

Astrophysics Tools: RADMC-3D (radiative transfer), FARGO3D (hydrodynamics).