

The physics of Gamma-Ray Bursts and multi-messenger sources unveiled by the SVOM and Einstein Probe satellites

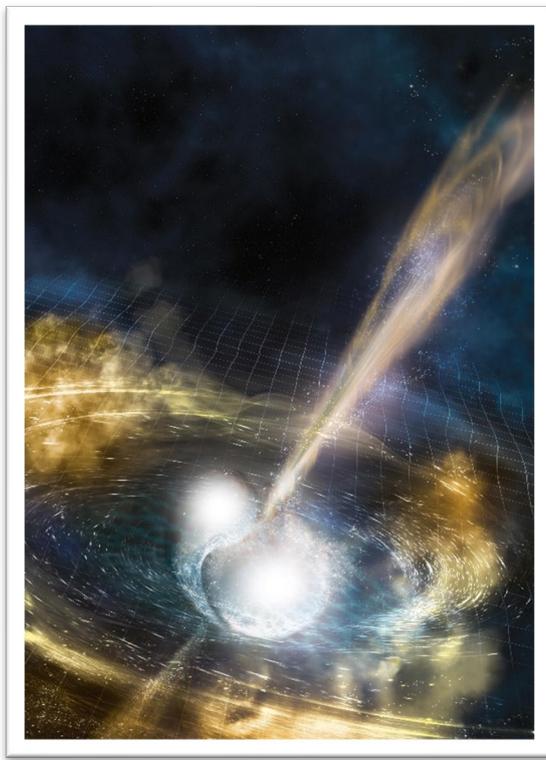
<ul style="list-style-type: none">• Unique UK access to two new space missions, SVOM and Einstein Probe, due for launch in 2023• Identify and characterise a new sample of Gamma-ray Bursts• Identify electromagnetic counterparts to multi-messenger sources	Level	PhD
	First Supervisor	Prof Paul O'Brien pto2@le.ac.uk
	Second Supervisor	Dr Rhaana Starling
	Application Closing Date	20 th January 2023
	PhD Start date	September 2023

Project Details:

Gamma-Ray Bursts are the most powerful sources of electromagnetic energy known in the universe. They are also related to other transients, most notably as potential counterparts of gravitational wave sources. The electromagnetic discovery space is about to expand dramatically thanks to the availability of two new powerful space missions called SVOM and Einstein Probe. These missions are both due for launch in the second half of 2023, at the start of the PhD. Professor Paul O'Brien, the first supervisor of this PhD, has unique UK investigator status on both missions, with full data rights to the proprietary surveys (he is a Co-investigator on SVOM and the ESA appointed scientist on Einstein Probe). The student will have access to these data and to complementary data from other facilities.

This PhD is to exploit observational data from SVOM and Einstein Probe, and multiple related facilities, to constrain the multi-wavelength properties of GRBs and to investigate the properties of multi-messenger sources. In particular, this PhD project will exploit the power of the missions to: (a) probe the early emission from GRBs, constraining the emission process, the production of flares and the relation between the observed emission and the central engine; and (b) search for counterparts to gravitational-wave sources using the extremely wide-field soft X-ray survey capability of Einstein Probe and the multi-wavelength capability of SVOM.

At Leicester we strive to characterize the transient universe by undertaking coordinated searches for electromagnetic counterparts to new transient events by using many ground and space observatories observing across the entire electromagnetic spectrum. Although primarily an observational project, there will be ample scope during the PhD to fit theoretical models to the data. The students will also have the opportunity to interact with the mission teams, who conduct the real-time operations. The ability to work with people who designed and built the observing facilities, developed the data processing software, construct theoretical models and interpret the results provides the ideal environment for rapid progress.



GW170817.jpg. Artist's impression of a binary neutron star merger which is emitting gravitational waves and launching a relativistic jet. Credit: LIGO Scientific Collaboration



The SVOM satellite. The Space Variable Objects Monitor (SVOM) satellite. SVOM carries four instruments providing coverage from optical to MeV energies. The project also has several ground-based telescopes observing in the optical and IR. Credit: CNES

References:

- The SVOM mission - <https://www.svom.eu/en/portfolio/the-svom-mission/>
- The Einstein Probe mission - <https://ep.bao.ac.cn/ep/>
- Paul O'Brien's publications - <https://ui.adsabs.harvard.edu/user/libraries/Oodl6YCRT5G4N7SnGyJpJw>
- Gamm-Ray Bursts - <https://iopscience.iop.org/book/mono/978-0-7503-1502-9>

How to apply:

Include with your application:-

- CV
- Degree Certificates and Transcripts
- Details of any study currently being undertaken
- Personal statement
- Enter the supervisor's name and project title in the Proposal Section (no proposal required)
- Enter contact details of two academic referees in the boxes provided or upload reference letters if already obtained.
- Evidence of English language if applicable.
- In the funding section include: Ref: O'Brien - UKRI (STFC)

The University of Leicester School of Physics and Astronomy has advertised a number of PhD opportunities. If you are applying for more than one University of Leicester project, please indicate if this is your first, second or third choice, in your application.

Further information on how to apply and funding can be found [here](#)