Gamma-Ray Bursts discovered by the SVOM satellite

- **New space mission SVOM due for launch in late 2022**
- **Will identify and characterise a sample of Gamma-Ray Bursts**
- **Will have capabilities to study multi-messenger sources**

Level	PhD
First Supervisor	Paul O'Brien
Second Supervisor	Rhaana Starling
Application Closing Date	19 January 2022
PhD Start date:	26 September 2022

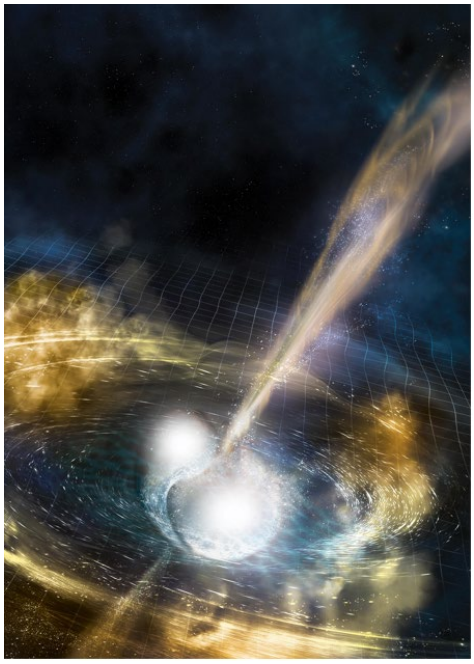
Project Details:

The SVOM satellite

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 sources of gravitational waves. The discovery space is about to expand further thanks to the availability of new, powerful facilities on ground and in space including the SVOM mission, due for launch at the end of 2022. Leicester has unique UK investigator status on SVOM, with full data rights, as we have provided the X-ray optics for one of the instruments via a team led by Paul O'Brien.

This PhD is to exploit SVOM and related facilities to constrain the multi-wavelength properties of GRBs. In particular, this project will exploit the power of SVOM in combination with other facilities to 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.

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. These observatories include Swift, GOTO, HESS, CTA, VLT, HST, JWST, Chandra and GMRT. The SVOM satellite will greatly enhance the search for high-energy transients, providing a powerful complement to the highly successful Swift.



Explosive transient

By combining the data from multiple facilities, we both discover and characterise transients. Over the next few years, the combination of enhanced survey capability simultaneously in the optical, X-ray, gamma-ray and very high-energy emission bands will bring many new discoveries some of which may also have gravitational-wave and neutrino counterparts.

We have a large, highly successful team of staff and students studying many types of transient, providing a strong support

Further information on how to apply and funding can be found HERE

system for PhD students. We also work with our colleagues in theoretical astrophysics to construct detailed models which predict the behaviour of transient sources. Students also frequently join the mission teams, providing an opportunity to participate in the real-time operation of space and ground facilities. 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.

The project area is observational astrophysics, involving processing, analysis and modelling of data, leading to scientific interpretation. The student will develop their data-handling skills across a range of wavelengths through hands-on experience and, particularly in modelling the observations, prior programming skills are an advantage.

References:

1 The SVOM mission - https://www.svom.eu/en/portfolio/the-svom-mission/

2 GRB progenitors - https://arxiv.org/abs/1611.03091

3 GRB190829A – an example of a high-energy GRB seen by the H.E.S.S. telescope - https://arxiv.org/abs/2106.02510

4 Paul O'Brien's publications - https://ui.adsabs.harvard.edu/user/libraries/0odI6YCRT5G4N7SnGyJpJw