UNIVERSITY OF LEICESTER

From gamma-ray bursts to fast radio bursts: the nature of astrophysical transients across the electromagnetic spectrum.

• Reveal the drivers of an ever-increasing and diversifying population of astrophysical transients. • Real-time observational follow-up of high energy transients from recently launched space missions SVOM and Einstein Probe. • Deploy radio transient search techniques on upgraded LOFAR 2.0 array, pathfinder for the Square Kilometre Array.	**Level**	PhD
	First Supervisor	Dr Rhaana Starling rlcs1@leicester.ac.uk
	Second Supervisor	Prof Nial Tanvir
	Application Closing Date	See web page
	PhD Start date	21st September 2026

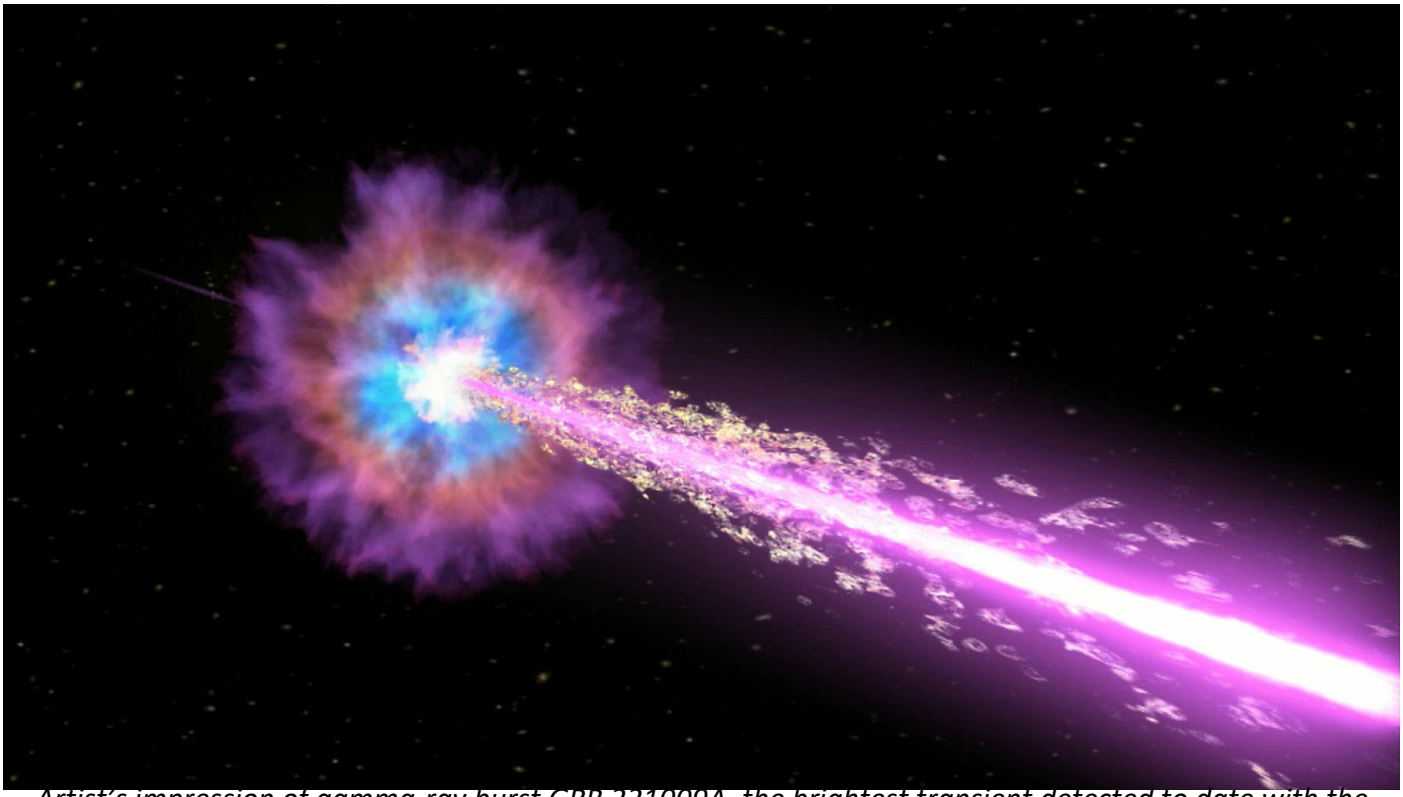
Details:

Every day new, short-lived astrophysical sources are discovered by observational facilities at gamma-ray, X-ray, optical and radio wavelengths. These transient phenomena often indicate a catastrophic event has taken place, such as the death of a massive star, merger of two compact objects – binary neutron stars and black holes, or tidal disruption of a star by a black hole. Some astrophysical transients we know to originate in the interaction of shocks within fast-moving streams or collimated outflows from accretion-powered engines. New facilities are increasing the rate of discovery of new transients, revealing a very diverse population among which many of the progenitors and emission mechanisms remain unknown.

Techniques to search for low-frequency radio transients on timescales of seconds to minutes have matured during the first decade of operations of the low-frequency array, LOFAR, and mid-2026 sees the re-launch of this facility in its upgraded capacity as LOFAR 2.0. This brings the opportunity to observe with both low- and high-band antennas simultaneously, and to follow up transients discovered elsewhere within minutes. LOFAR is a Square Kilometre Array pathfinder, meaning that these studies will help shape the future of radio astronomy when next generation SKA takes the lead.

At the other end of the electromagnetic spectrum, X-ray transient populations have expanded in the past year or so following the launch of two space missions in which the University of Leicester are key contributors. Both SVOM and Einstein Probe detect Fast X-ray Transients, in addition to the somewhat better-known gamma-ray bursts and tidal disruption events, and ground- and space-based follow-up is only just touching upon the potentially diverse physics that drives these transients.

In this observational project you will study the nature of transient sources through rapid response to unfolding events and searches for new examples and counterparts in wide-field survey and other data spanning radio, optical and high energies. The University of Leicester has a rich history in this area and continues to lead key advancements in instrumentation and data exploitation, providing a knowledgeable and supportive team to guide you as you become an independent researcher in a frontier area of science.



Artist's impression of gamma-ray burst GRB 221009A, the brightest transient detected to date with the NASA Neil Gehrels Swift Observatory in which the University of Leicester are one of three international partners. Credit: NASA/Swift/Cruz deWilde.

Further Reading:

- *The Kangaroo's First Hop: The Early Fast Cooling Phase of EP250108a/SN 2025kg* Eyles-Ferris et al. 2025, ApJ Letters, 988, 14 Preprint accessible at: https://arxiv.org/pdf/2504.08886

- *A candidate coherent radio flash following a neutron star merger* Rowlinson et al. 2024, MNRAS, 534, 2592 Preprint accessible at: https://arxiv.org/pdf/2312.04237

- https://www.astron.nl/telescopes/lofar/
- https://www.svom.eu/en/home/

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