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# Relativistic Jets from Stellar Mass Black Holes and Neutron Stars


## Abstract

Relativistic jets are amongst the most important and powerful phenomena in astrophysics, and yet also amongst the least understood. Most well known in the context of supermassive black holes (SMBH) in active galactic nuclei (AGN), relativistic jets are also the underlying mechanism behind gamma-ray bursts (GRBs) and LIGO neutron star merger afterglows, and a fundamental component of Tidal Disruption Event (TDEs) and Ultraluminous X-ray sources (ULX). The enormous impact of AGN jets is well recognised: they act to strongly heat the cluster gas around their host galaxy and hence regulate its growth. Stellar mass (<20 solar mass) black holes and neutron stars in binary systems, known as ‘X-ray binaries’ (XRBs), are the local, lower-mass, and hence faster-evolving analogues to AGN. The near scale-independence of the accretion and jet properties with black hole mass is theoretically expected and observationally established. Radio observations of X-ray binaries are as a result the most important probes of relativistic jet formation in our galaxy and the local universe.

Based upon the success of our comprehensive pilot programme we request a large and multi-year programme to study the core radio luminosity and large scale jets of XRBs. Moving beyond our pilot programme, we will perform polarisation studies, use S-band observations to provide better localisation of moving ejecta, and make higher-cadence observations of neutron star systems. In addition we bring a new programme of guaranteed enhanced optical coverage from the Las Cumbres Observatories as well as detailed theoretical modelling and a vast array of complementary facilties.