MKT-20148

Investigating the properties of localised Fast Radio Bursts and their host galaxies

Abstract

Fast Radio Bursts (FRBs) are short-duration bursts of radio emission that are emitted by sources at extragalactic/cosmological distances (e.g., Thornton et al. 2013). The possible nature of the progenitors generating these bursts range from merging neutron stars to newly born magnetars (Platts et al. 2019). Since mid-2018, the Australian Square Kilometre Array Pathfinder (ASKAP) has localised 10 FRBs to arcsecond precision (Bannister et al. 2019; Bhandari et al. 2020). Optical observations of these sources have enabled the burst host galaxies to be identified and redshifts to be measured (z ~0.1 - 0.5). Strikingly, the host galaxies of these FRBs are quite unlike that of the first FRB to be firmly associated with a galaxy, FRB 121102. They are typically massive galaxies with low specific star formation rates, completely different to FRB121102's low-mass, low-metallicity, highly star-forming host. Progress in understanding FRB progenitors depends on investigating FRB host galaxy properties, star formation rates, immediate environments and burst properties.
Our main goals are:
(i) Characterise the global properties of host galaxies (radio AGN activity, star formation).
(ii)Determine whether FRB progenitors are embedded in radio nebulae, akin to the persistent radio source at the location of the repeating FRB 121102.
We propose to target 7 FRB positions for 2 or 3 epochs each. Multi-epoch observations will constrain variability of the persistent emission, if detected. Nearer sources will be prioritised, and a mix of repeating and non-repeating, well-localised FRBs will be targeted. We will arrange for simultaneous multi-wavelength observations including H.E.S.S. and other telescopes.