

Probing the local environments and host galaxy properties of localised Fast Radio Bursts

Abstract

Fast Radio Bursts (FRBs) are microsecond to millisecond-duration pulses occurring at Galactic to cosmological distances (Thornton et al. 2013). Presently, only a couple of prolific repeating FRBs have compact, persistent emission associated with them. The persistent sources might be key to understanding the evolution, energetics and the formation of the FRB. Progress in understanding FRB progenitors depends on investigating FRB host galaxy properties, star formation rates (SFRs), immediate environments and burst properties. The main goals of our proposed observations are to: (i) characterise the global properties of a sample of host galaxies (radio active galactic nuclei [AGN] activity, star formation), (ii) determine whether more FRBs are embedded in radio nebulae, akin to the persistent radio sources (PRSs) associated with FRBs 20121102A and 20190520B. We propose to target 11 FRB positions to probe a range of redshifts and host galaxy types. We propose multi-epoch observations to constrain variability of the persistent emission, as seen for FRB 20121102A. A mix of repeating and non-repeating, well-localised FRBs will be targeted. To extract the maximum science from these observations, we will also arrange for simultaneous multi-wavelength observations including H.E.S.S. and other telescopes.