

Title

Radio counterparts of the GW sky with MeerKAT

Abstract

The last years witnessed a blossoming of multi-messenger (MM) astrophysics, in which gravitational waves (GW), neutrinos and photons provided complementary views of the same source. The great potential of this new era of astronomy was fully realised by the discovery of GW170817 and its electromagnetic (EM) counterparts, GRB170817A. Radio observations critically probe the non-thermal emission from the relativistic jet and its evolution, constraining the geometry and the structure of the jet, as probed by the evolution of the pre-peak phase. MeerKAT is currently the only radio interferometer able to cover the Southern sky with the necessary sensitivity and angular resolution to study the radio counterparts of GW events identified by the ENGRAVE project. With this proposal, we aim at detecting the radio counterparts of GW sources from O4, and following their evolution. In particular, we propose to perform multi-epoch observations at 2.5 GHz (S-SPW2 band) of two events with a counterpart classified as bona-fide, following the identification and association at other wavelengths. Finally, since O4 can bring the breakthrough discovery of a neutron star-black hole (NSBH) EM counterpart, one of our core goals is to detect and characterise the radio emission of such class of GW events. MeerKAT data will be combined with ATCA and high-energy ones (X-rays, hard X-rays) to constrain and model the non-thermal emission of the GW counterparts, and in particular to determine the synchrotron peak and self-absorption frequencies, that encode information on the medium density.