

Title

Polarised Bursts from a Potential New Class of White Dwarf Pulsars

Abstract

We propose to observe two sources hypothesised to be binary systems of a white dwarf (WD) with a low-mass companion: ASKAP J1745 and WD40. Both exhibit persistent and bursting radio emission, which is intermittent but repeats periodically when it occurs. Optical photometry and spectroscopy -- as well as UV detections -- support the WD hypothesis, and the radio variability suggests binarity. There are very few radio-detected WD systems, all of which are binaries. Of the ~10,000 nearby WD binaries and cataclysmic variables (CVs) less than 40 have been observed to produce radio emission. Confirming the nature of these WD binaries would add to this limited population. ASKAP J1745 and WD40 both have radio-luminosities more than two orders of magnitude above the mean value for radio-bright CVs and magnetic CVs (MCVs). This may suggest that the targets are an unusual part of the MCV population, or otherwise part of the new class of WD pulsars --- like AR Scorpii and J191213.72-441045.1. These rare objects, which exhibit both minutes- and hours-long pulsations, have been suggested to be the progenitors of the long period transients. We have detected these targets with ATCA and ASKAP, with the pulses being cut off by the lower-edge of their respective observing bands. MeerKAT has a wide, 856 MHz bandwidth at L-band, and can reach RMS noise levels of ~0.2 mJy per beam in 8 seconds. It also has greater instantaneous sensitivity, making MeerKAT the perfect instrument to search for variability on both minutes- and hours-long timescales.