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Redshift evolution of the HI detection rate in radio-loud active galactic nuclei

Abstract

We propose to search for associated HI absorption in 26 radio sources in the redshift range 0.25<z<0.7. The studies done so far have shown that a drop in the detection rate of associated HI seems to occur between low-z (z < 0.25) and high-z (z>0.7) radio sources. This change may be due to redshift evolution of the HI conditions (e.g. spin temperature), or caused by a higher UV luminosity of the high-z AGN which ionises the HI.
With our proposal we aim at confirming and localise (in z) where this change occurs and attempt to distinguish between these options.
With the sample we propose to observe (0.25 < z < 0.7), we will be able to bridge low- and high-z results. The sample is extremely well characterised thanks to an extensive set of multi-wavelength ancillary data. This, in combination with the sensitivity over a large frequency range and the good RFI conditions offered by MeerKAT, allow us to derive the HI detection rates for a variety of radio sources and carry out a meaningful comparison with the results at low-z. We will be able to pin down whether any difference in the detection rate is occurring and, if so, at which z, or for which type of sources. Because of the good knowledge of the flux of the central regions (where usually the associated HI absorption is occurring), the observations are devised such that, even for undetected sources, will derive useful optical depth limits.