

Title

Further Observations of Three Complex HI 21-cm Absorption Systems

Abstract

The HI 21-cm absorption lines, which emerge when HI gas absorbs radiation from a bright background source, serve as an excellent tool for studying gas and galaxy evolution at higher redshifts. Although extensively studied, the precise nature of Damped Lyman α Absorbers (DLAs) remains unresolved. Besides, the small sample size limits the statistical significance of findings and leaves the contribution of HI to super mass black holes (SMBHs) fueling without definitive observational proof. To overcome this, we have conducted a blind search for HI 21-cm absorption in the data (CRAFTS, FASHI and HIMGS) from Five-hundred-meter Aperture Spherical Telescope (FAST) and produced a catalogue of HI 21-cm absorption. However, the beam resolution of FAST limits our ability to examine the fine structure and dynamics of the HI gas in detail. To address this limitation, we intend to utilize MeerKAT for follow-up observations in interferometric mode, enabling a more detailed study of the HI properties of the absorption systems. We propose a total allocation of 16 hours (including 4-hours overheads) in L-band 107 MHz narrowband mode for three little-studied or new HI 21-cm absorption systems (4C -06.18, NVSS J094208+135152, and NVSS J053118+315412) with complex absorption profiles for detailed observation with MeerKAT. The MeerKAT observations will provide insights into the temperature, column density, and dynamics of ISM, as well as its interactions with SMBHs. This will offer a prime opportunity to explore the nature of HI absorbers and their relationships with their host galaxies.