Title

Confirmation of the highest redshift H i detection lensed by the Abell 370 Hubble Frontier Field

Abstract

Until now, direct detections of HI emission have been limited to z ~ 0.3-0.4. consequently our constraints of the HI mass of galaxies beyond that rely on indirect methods such as: stacking, intensity mapping, HI absorption, and Lyman-· systems. Direct HI emission detections are essential to breaking model degeneracies and resolving discrepancies due to a wide range of systematics on measurements of the cosmic evolution of HI volume density. Following a 4.5 · detection in our pilot 12-hour observation, we propose a deeper UHF observation of the Hubble Frontier Field lensing cluster Abell 370 to provide one of the deepest view of the HI universe in emission. An observation of 75 hours on-source will lead to an 2.7 times factor increase in signal-to-noise, enabling confirmation of our initial detection, the velocity width, as well as paving the way to detections of multiple highly magnified z ~ 0.4-1.4 candidates. This programme will provide a unique HI survey tier that will directly probe the high-z HI volume density through leveraging gravitational lensing, as well as providing commensal science output through chance discoveries and HI stacking.