

FAST Proposal Coverpage

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Project Name:

Quantifying HI in Galaxies with Unusually High Molecular-to-Atomic Gas Ratios

Project Summary:

Atomic hydrogen (HI) and molecular hydrogen (H₂) in the interstellar medium (ISM) play a crucial role in galaxy formation and evolution. Galaxies with a considerable fraction of molecular gas are expected to have abundant HI as well, as generally seen from previous observations, since H₂ is formed out of HI. Recently, we have identified a handful of galaxies with clear CO (molecular gas) detections by either IRAM or JCMT, but no HI detection by neither Arecibo nor GBT. The physical reasons behind these extreme cases are puzzling. Deeper HI observations are clearly needed to separate sensitivity-driven experimental constraints vs. physical reasons, such a unique evolutionary stage. We apply for a total time of 9.5 hours (including overhead) to substantially improve the detection threshold of the HI in these galaxies. The data will provide a stringent constraint on the molecular-to-atomic ratio ($R_{\text{mol}}=M_{\text{H}_2}/M_{\text{HI}}$) for these galaxies. The study will shed light on the physical origin of the extremely high R_{mol} by examining both the internal properties of galaxies and their environment.