

Proposal Abstract:

Atomic hydrogen (HI) is vital to understand galaxy quenching. However, due to the limited sensitivity of current HI surveys, it is still unclear how much HI gas red(quenched) galaxies possess. Recently, we have developed an HI estimator which is proven to be unbiased to the general galaxy population. Our HI estimator predicts that nearly all red galaxies have $\log M_{\text{HI}}/M_* > -2.4$. Last year we examined this prediction by observing a sample of 78 randomly selected red galaxies down to $\log M_{\text{HI}}/M_* = -2.4$ (PT2023_0025). The observation and data reduction is finished. In 31 galaxies we detect HI signal, the other galaxies are HI-undetected and have $\log M_{\text{HI}}/M_* < -2.4$. This shows that most of the red galaxies are extremely HI-poor and do not follow the same HI scaling relations as star-forming galaxies. We propose to further observe the HI-undetected red galaxies down to $\log M_{\text{HI}}/M_* = -3$ to directly detect their HI gas. This data is essential to construct an HI representative sample of red galaxies with a high detection rate and would provide key information on the HI gas property and quenching mechanism of red galaxies.