

To map the Warm Ionized Medium in the Galaxy using MeerKAT and FAST

Abstract

We aim to map the Warm Ionized Medium (WIM) along the Galactic plane through Radio Recombination Line (RRL) observations. Thirty-nine hydrogen RRL α -lines (H157 α - H196 α) are covered by the MeerKAT L-band. They will be stacked to acquire high signal-to-noise ratio detections. A data-cube of stacked RRL covering one square degree will be produced by combining one pointing observation of MeerKAT with the FAST data using the Multi-Beam On-The-Fly mode. Benefiting from the world's most sensitive array and single dish telescopes at L-band, ionized gases with angular scales of $\sim 0.1'$, $\sim 1'$, and $\sim 10'$ will be imaged with high signal-to-noise ratio all together for the first time. This data product will be used to identify HII regions at tens of arcseconds scale, to analyze the interaction of HII region with its ionized environment at arcminutes scale, and to study the formation and distribution of WIM at tens of arcminutes scale.

This project serves as a experimental study for a future survey of large scale Galactic WIM with the synergy between the MeerKAT and the FAST.