

Title

Piloting a MeerKAT UHF-band Recombination Line Survey

Abstract

We propose a 3-pointing pilot study to map the Warm Ionized Medium (WIM) in the Galactic midplane towards the star-forming region W43 using UHF-band recombination line (RRL) measurements. The observations will simultaneously cover 38 alpha lines; the RRLs will be averaged to produce data cubes with rms sensitivities of 0.06 mJy/b at natural-weighting spatial resolution. Our primary science goals are to use hydrogen RRLs to 1) provide a census of and map the morphology of low-density ionized gas (which may be missed at higher frequencies), 2) constrain the ionized gas density (through multi-band comparisons of the RRL intensities) and estimate gas turbulence, pressure and mass (flow rates), and 3) study the WIM unaffected by confusion from discrete HII regions (only possible at high resolution). Secondary science goals use (a) the continuum to confirm newly-identified supernova remnant candidates and (b) carbon RRLs to reveal the morphology of elusive cold HI and CO-dark molecular gas phases. These observations will allow us to test technical approaches (of a survey) including (i) UV-stacking of the recombination lines, (ii) combining GBT 800 MHz RRL survey data with the interferometric line emission data, (iii) UV coverage from an interleaved observing strategy, and (iv) mosaicking.