

Proposal Abstract:

Warm Ionized Medium (WIM) is one of the major components of the diffuse Interstellar Medium (ISM), making up 20% of the total Milky Way gas mass and 90% of its ionized gas mass. It is dynamically important, providing a link between current and previous generations of massive stars. Radio Recombination Lines (RRLs) provide an unobscured direct probe of such ionized environments. To trace the distribution of Warm Ionized Medium (WIM) in the disk of Milky Way, we propose the FAST Recombination Line Survey towards the Galactic middle plane. It is a long term survey programme, which will cover the entire Galactic plane observable by FAST. The survey data will be used to draw the most sensitive WIM distribution on the Galactic plane and to locate the hidden massive star-forming regions. While in the first five years, observations of the first segment ($50^\circ > l > 30^\circ$, $|b| < 0.5^\circ$) will be deployed. After performing pilot RRL studies with FAST in the past three years, we have earned valuable experiences and made reliable results. To continue the survey progress, we propose to finish the observations of regular regions within the first segment.