



Mapping Hydrogen in the Galaxy, Galactic Halo and Local Group with the Galactic Arecibo L-Band Feed Array (GALFA-HI)



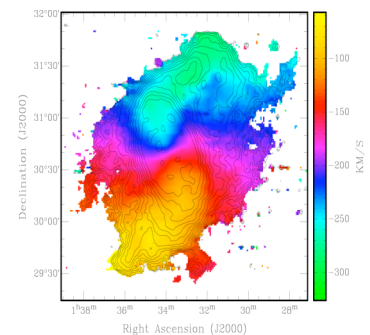
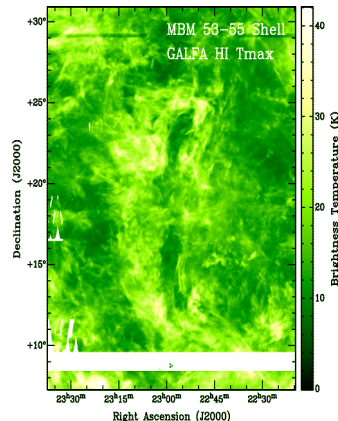
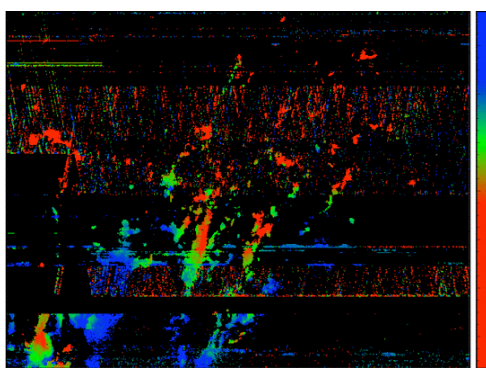
The **GALFA-HI** Survey is imaging the entire Arecibo sky ($\sim 12,000$ square degrees) at 21-cm over a velocity range of -700 to $+700$ km/s, with a resolution of 0.2 km/s and $3.4'$. This survey has a 100 times smaller beam area than the best existing large-area HI surveys and is revolutionizing our view of the neutral interstellar gas. GALFA-HI is possible due to the unique combination of Arecibo's sensitivity, angular resolution, and the new array of seven feeds (ALFA).



ALFA: Arecibo L-band Feed Array

The scientific highlights of the GALFA-HI survey include:

- Discovery that the extra-planar gas in the outer Milky Way is in the form of cold HI clouds.
- New method for estimating distances of high-velocity clouds based on differential drag and the detailed cloud features revealed by GALFA.
- HI images of the Milky Way hydrogen distribution with stunning detail and complexity.
- Discovery of a significant filamentary northern extension of the Magellanic Stream.
- Discovery of dust-free HI clouds in the Milky Way disk, potentially originating from the Galactic halo, based on the correlation of GALFA and infrared observations.
- Revealing the disruption and fueling of the Local Group dwarf spiral galaxy, M33.
- Training of the next generation of radio astronomers.



Left: The tip of the Magellanic Stream as observed by GALFA-HI showing newly discovered HI filaments (Stanimirovic et al. 2008). **Middle:** The nearby molecular cloud complex MBM 53-55, thought to be part of an expanding shell, showing the great complexity of HI at Galactic velocities (Gibson et al., in preparation). **Right:** A Local Group galaxy M33 as revealed by GALFA-HI. GALFA data, combined with simulations, reveal the clear disruption of this galaxy and the return of the disrupted gas to feed its future star formation (Putman et al. 2008).