The Formation of Giant Molecular Filaments

Abstract

We propose MeerKAT HI spectral imaging to map 7 giant molecular filaments, representative for the most prominent filaments in the Milky Way. Because giant filaments bridge massive star formation activities in GMCs and in spiral arms, their formation is of great interest for both Galactic and extragalactic astronomers. Combining HI and existing CO images, we will (1) use HI self-absorption (HISA) to isolate cold HI clouds from the warm ones, (2) derive the spatial distribution of [HI/H2] abundance ratio at a sub-pc resolution, and (3) study dynamics and mass rate of converging flows. These will enable a quantitative understanding of HI-to-H2 transition during molecular cloud formation out of the atomic ISM.