

[IM01] Velocity field of starless cores : L694-2 and L1197

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In an attempt to understand the dynamics of pre-stellar cores, we investigated in detail the velocity field of two pre-stellar cores, L694-2 and L1197 with high resolution HCN J=1-0 maps and a 1D Monte Carlo radiative transfer code.

It is found that infall motion arises most actively in the narrow region just outside of central flat region, while the cores are static or exhibit subsonic inward motion both in the central flat region and in the outermost part. Their peak velocities amount to 0.28 kms⁻¹ for L694-2 and 0.18 kms⁻¹ for L1197, which are much larger than previous estimation being less than 0.1 kms⁻¹. Our result is roughly in agreement with the gravitational collapse model of isothermal core, but the velocity gradient is steeper in the inner part than that of the models.

Our results also show that the outer layers of both cores are denser than Bonnor-Ebert sphere at 10K. HCN abundance relative to H₂ is spatially constant in L694-2 with a value of 6×10^{-9} , while it is slightly increasing inward for L1197 with a range of 1.6×10^{-9} to 2.7×10^{-9} .

[IM02] Are Forbidden-Velocity Wings Missing Old Supernova Remnants?

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Forbidden-Velocity Wings (FVWs) are high-velocity features that appear as small bumps protruding from their surroundings in large-scale (l,v) diagrams of HI 21-cm line emission in the Galactic plane. They are called as 'Forbidden-Velocity Wings' because they extend beyond the maximum or minimum velocities permitted by the Galactic rotation. They have been suspected as old SNRs that are too faint to be detected in radio continuum. We have carried out high-resolution observations of 14 FVWs among currently identified 87 FVWs using the 305-m Arecibo Telescope and the 100-m Green Bank Telescope. About 60% of the observed FVWs appear as expanding or stationary shells. Most of them do not have OB star inside. This result suggests that FVWs are indeed good candidates for very old Galactic SNRs invisible in radio continuum. The other 40% have irregular features and could be fragments of old SNRs or Halo clouds. Part of the results are obtained using the Arecibo L-band Feed Array, which is a newly-installed seven-feed system allowing large-scale surveys of the sky with unprecedented sensitivity.