[초IM-01] Effect of Dark Matter on the Collision of High Velocity Clouds with the Galactic Disk

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High velocity clouds (HVCs) are H I clouds that move with large speed (|V_{LSR} |>100 km/s) in the halo of the Milky Way. It is now evident that at least some populations of HVCs originated from extragalactic sources, either primordial gas left over from the galaxy formation or gaseous material stripped off from other galaxies closely passing by the Milky Way. HVCs with extragalactic origin play an important role in the star formation of the Milky Way when they eventually collide with the disk of the Milky Way. Although it is still observationally controversial whether HVCs are surrounded by dark matter or not, it is theoretically interesting to investigate the effect of dark matter on the collision of HVCs with the disk of the Milky Way. We model this scenario by using hydrodynamic simulations and search for proper parameters that explain the currently available observations such as the Smith Cloud that is thought to have collided with the Galactic disk already.

[구IM-02] Instability of Evaporation Fronts in the Interstellar Medium

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The neutral component of the interstellar medium (ISM) is segregated into the cold neutral medium (CNM) and warm neutral medium (WNM) as a result of thermal instability. It was found that the CNM--WNM evaporation interface, across which the CNM undergoes thermal expansion, is linearly unstable to corrugational disturbances, in complete analogy with the Darrieus-Landau instability (DLI) in terrestrial flames. To explore dynamical consequences of the DLI in the ISM, we perform a linear stability analysis of the DLI including the effect of thermal conduction as well as nonlinear hydrodynamic simulations. We find that the DLI is suppressed at short length scales via heat transport. The linear growth time of the fastest growing mode is proportional to the square of the evaporation flow speed of the CNM relative to the interface and is typically >10 Myr. In the nonlinear stage, perturbations grow into cusp-like structure protruding toward the WNM, and soon reach a steady state where the evaporation rate is increased by a factor of 2 compared to the initial state. We demonstrate that the amplitude of the interface distortion and enhancement in evaporation rate are determined primarily by the density ratio between the CNM and WNM. Given quite a long growth time and highly subsonic velocities at saturation, the DLI is unlikely to play an important role in the ISM dynamics.