[구IM-05] Wiggle Instability of Magnetized Spiral Shocks

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Galactic spiral arms are abundant with interesting gaseous substructures. It has been suggested that arm substructures arise from the wiggle instability (WI) of spiral shocks. While the nature of the WI remained elusive, our recent work without considering magnetic fields shows that the WI is physically originated from the accumulation of potential vorticity (PV) generated by deformed shock fronts. To elucidate the characteristics of the WI in more realistic galactic situations, we extend our previous linear stability analysis of spiral shocks by including magnetic fields. We find that magnetic fields reduce the amount of density compression at shocks, making the shock fronts to move toward the upstream direction. Magnetic tension forces from bent field lines stabilize the WI by prevent the generation of PV. When the spiral-arm forcing is F=5% of the centrifugal force of galaxy rotation, the maximum growth rate of the WI is found to be about 1.0, 0.4, and 0.2 times the orbital angular frequency for the plasma parameter β=100, 10, and 5, respectively. Shocks with β=1 are stable to the WI for F=5%, while becoming still unstable when F=10%.

[구IM-06] Tracing Metallicity in the Scenario of High Velocity Clouds (HVCs) Colliding with our Milky Way

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Questions of how our Milky Way evolves through the interaction with its environment have been constantly raised. One particularly interesting question is how the metallicity would change as our Milky Way goes through collision with HVCs. Because of the possibility of HVCs providing fuel for star formation in the Galactic disk, we simulate the collision between HVCs and the Galactic disk. More specifically, we trace how the Galactic metallicity changes throughout the process of HVCs colliding with our Milky Way based upon a specific scenario that HVCs are primordial gas left-overs from an ancient galaxy formation. Such mixing between metal-rich gas (disk) and metal-poor HVC can be traced by running numerical simulations with the FLASH code due to its capability of tracking down the abundance change of a specific element such as carbon at each time step of the hydrodynamic evolution. As for now, we give how this mixing depends on model parameters that we choose such as collision speed, initial metallicities, temperature and so on.