[포IM-11] High Dispersion Line Profiles of the Planetary Nebula NGC 6833 and its Implication

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Using the spectroscopic data secured with the Hamilton Echelle Spectrograph attached to a 3-m telescope at the Lick Observatory, we derived the expansion velocities from various line profiles in the 3600 Å to 10,000 Å based on the full width at half maximum and double peak of the high dispersion line profiles. The symmetrical shapes of the permitted line profiles indicate that the permitted line zone is symmetrical e.g., a spherical shell or bipolar + torus structures, which might be evidence of relatively recent ejection from the central star. Most other stronger forbidden lines might be coming from a main shell which appears as a bilateral symmetrical morphology, seen in HST and other ground-based telescopic images. The overall expansion velocities of this main shell structure that are responsible for most lines, seem to show the Hubble type expansion, i.e., accelerating shell. The faster expansion velocities of the permitted OII, NII, NIII and perhaps CII lines that do not suit to the Hubble type expansion, imply the existence of a somewhat smaller inner shell inside the outer main shell. We conclude that the nebular shell consists of a swiftly expanding inner shell and an outer normal shell excited by a central star of about 55,000K. The former compact zone appears to be responsible for the permitted C, N, and O lines while the latter extended shell appears to be responsible for H, He, and forbidden lines. We present some evidence that NGC 6833 be a member of the Galactic halo.

[구IM-12] On the Chemical Evolution of Collapsing Starless Cores

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In order to understand internal dynamics of starless cores, molecular line emissions are usually observed. From profiles of the molecular lines, internal motions of starless cores have been deduced using a simple radiative transfer model such as the two-layer model (Myers et al.1996). This brings complexities arising from the chemical evolution. The motivation of this study is to follow the chemical evolution of a starless core that goes through gravitational contraction. For this purpose, we have performed hydrodynamical simulations with a marginally unstable Bonnor-Ebert sphere as an initial condition. We follow the chemical evolution of this core with changing conditions such as the chemical reaction rate at the dust surface and the strength of radiation field that penetrate into the core. At the core center, the molecules suffer from a higher degree of molecular depletion on the dust covered by ice rather than on the bare silicate dust. The stronger radiation field dissociates more molecules at the core envelope. From analysis on the line profile using the two-layer model, we found that the speed of inward motion deduced from the HCN F = 2-1 line adequately traces the true infall speed, when the dust is covered by ice and the core is exposed to the diffuse interstellar radiation field. Under different conditions, the two-layer model significantly underestimate the infall speed.