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Most galaxies are believed to evolve through mergers and accretions. In particular, minor mergers and gas accretion appear to play an important role in galaxy evolution in the present-day Universe. Tidally-disrupted debris from such processes remain as diffuse, low-surface brightness structures because the dynamical timescale in the outskirts is significantly longer than that in the central regions. Although these structures will give us useful insight into the mass assembly history of galaxies, it is difficult to detect them due to their faint surface brightness. In order to investigate the structural properties of outskirts in nearby galaxies, we conduct deep and wide-field imaging survey with KMTNet. We present our observing strategy and an optimal data reduction process to recover faint extended features in the images of KMTNet. Using the imaging data of NGC 1291 obtained from KMTNet, we find that a peak-to-peak sky gradient can be reduced less than 0.4-0.6% of the original sky level in the entire image. We also find that we can reach the surface brightness of $\mu_{(B,1\sigma)}$ ~ 29.5, $\mu_{(R,1\sigma)}$ ~ 28.5 mag arcsec^{-2} in one-dimensional profile, that is mainly limited by the uncertainty in the sky determination. It indicates that deep imaging data of KMTNet is suitable to study the extended faint features of nearby galaxies, such as stellar halos, outer disks, and dwarf companions.

성간물질

[박 IM-01] Destruction of Giant Molecular Clouds by UV Radiation Feedback from Massive Stars

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Star formation in galaxies predominantly takes place in giant molecular clouds (GMCs). While it is widely believed that UV radiation feedback from young massive stars can destroy natal GMCs by exciting HII regions and driving their expansion, our understanding on how this actually occurs remains incomplete. To quantitatively assess the effect of UV radiation feedback on cloud disruption, we conduct a series of theoretical studies on the dynamics of HII regions and its role in controlling the star formation efficiency (SFE) and lifetime of GMCs in a wide range of star-forming environments. We first develop a semi-analytic model for the expansion of spherical dusty HII regions driven by the combination of gas and radiation pressures, finding that GMCs in normal disk galaxies are destroyed by gas-pressure driven expansion with SFE < 10%, while more dense and massive clouds with higher SFE are disrupted primarily by radiation pressure. Next, we turn to radiation hydrodynamic simulations of GMC dispersal to allow for self-consistent star formation as well as inhomogeneous density and velocity structures arising from supersonic turbulence. For this, we develop an efficient parallel algorithm for ray tracing method, which enables us to probe a range of cloud masses and sizes. Our parameter study shows that the net SFE, lifetime (measured in units of free-fall time), and the importance of radiation pressure (relative to photoionization) increase primarily with the initial surface density of the cloud. Unlike in the idealized spherical model, we find that the dominant mass loss mechanism is photoevaporation rather than dynamical ejection and that a significant fraction of radiation escapes through low optical-depth channels. We will discuss the astronomical

[구 IM-02] Global distribution of far-ultraviolet emission from the highly ionized gas in the Milky Way

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One of the keys to interpreting the characteristics and evolution of interstellar medium in the Milky Way is to understand the distribution of hot gas (10^5–10^6 K). Gases in this phase are difficult to observe because they are in low density and lack of easily observable tracers. Hot gases are observed mainly in the emission of the FUV (912−1800 Å), EUV (80−912 Å), and X-rays ($T>10^6$ K) of which attenuation is very high. Of these, FUV emission lines originated from high-stage ions such as O VI and C IV can be the most effective tracers of hot gases. To determine the spatial distribution of O VI and C IV emissions, we have analyzed the spectra obtained from FIMS (Far-ultraviolet IMaging Spectrograph), which covers about 80 percent of the sky. The hot gas volume filling factor, which varies widely from 0.1