context of the stellar light illumination through a porous envelope with postulated longer-term variations for a period of 10 years.

[구 IS-02] Role of Mass Inflow and Supernova Feedback on Nuclear Ring Star Formation

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Observations suggest the star formation in nuclear rings of barred galaxies proceeds episodically in time and sometimes asymmetrically in space. Existing theories and numerical simulations suggest that the episodic star formation is perhaps due to either supernova feedback combined with fluid instabilities or time-varying mass inflow rate. However, it has been challenging to discern what dominates in shaping the star formation history because the effects of the inflow and feedback are blended in global simulations of nuclear rings. To understand their effects separately, we construct semi-global models of nuclear rings, which treat the mass inflow rate as a model parameter. By running simulations with the inflow rates kept constant or oscillating in time, we find that the star formation rate (SFR) of the rings varies coherently with the inflow rate, while the feedback is responsible only for stochastic fluctuations of the SFR within a factor of two. The feedback instead plays an important role in maintaining the vertical dynamical equilibrium and setting the depletion time. While the asymmetry in the inflow does not necessarily lead to the asymmetry in the star formation, we find that the rings undergo a transient period of lopsided star formation when the inflow rate of only one dust lane is suddenly increased.

[박 IS-03] TRAO-TIMES: Investigating Turbulence and Chemistry in Two Star-forming Molecular clouds

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Turbulence produces the density and velocity fluctuations in molecular clouds, and dense regions within the density fluctuation are the birthplace of stars. Also, turbulence can produce non-thermal pressure against gravity. Thus, turbulence plays a crucial roles in controlling star formation. However, despite many years of study, the detailed relation between turbulence and star formation remain poorly understood. As part of the Taeduk Radio Astronomy Observatory (TRAO) Key Science Program (KSP), "mapping Turbulent properties In star-forming MolEcular clouds down to the Sonic scale (TIMES; PI: Jeong-Eun Lee)", we mapped two star-forming molecular clouds, the Orion A and the ρ Ophiuchus molecular clouds, in six molecular lines (^{13}CO 1-0/C^{18}O 1-0, HCN 1-0/HCO^{+} 1-0, and CS 2-1/N$_2$H^{+} 1-0) using the TRAO 14-m telescope. We applied the Principal Component Analysis (PCA) to the observed data in two different ways. The first method is analyzing the variation of line intensities in velocity space to evaluate the velocity power spectrum of underlying turbulence. We investigated the relation between the star formation activities and properties of turbulence. The other method is analyzing the variation of the integrated intensities between the molecular lines to find the characteristic correlation between them. We found that the HCN, HCO^{+}, and CS lines well correlate with each other in the integral shaped filament in the Orion A cloud, while the HCO^{+} line is anti-correlate with the HCN and CS lines in L1688 of the Ophiuchus cloud.

[구 IS-04] Complex organic molecules detected in twelve high mass star forming regions with ALMA

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One of the key questions on star formation is how the organic molecules are synthesized and delivered to the planets and comets since they are the building blocks of prebiotic molecules such as amino acid, which is thought to contribute to bringing life on Earth. Recent astrochemical models and experiments have explained that complex organic molecules (COMs; molecules composed of six or more atoms) are produced on the dust grain mantles in cold and dense gas in prestellar cores. However, the chemical networks and the roles of physical conditions on chemistry are not still understood well. To address this question, hot (> 100 K) cores in high mass young stellar objects (M > 8 Msun) are great laboratories due to their strong emissions and larger samples than those of low-mass counterparts. In addition, CH_3OH masers, which have been mostly found in high mass star forming regions, can provide constraints due to their very unique emerging mechanisms. We investigate twelve high mass star forming regions in ALMA band 6 observation. They are associated with 44/95 GHz Class I and 6.7 GHz Class II CH3OH masers, implying that the active accretion processes are ongoing. For these previously unresolved regions, 66 continuum peaks are detected. Among them, we found 28 cores emitting COMs and specified 10 cores associated with 6.7 GHz Class II CH3OH masers. The chemical diversity of COMs is found in cores in terms of richness and complexity; we identified up to 19 COMs including oxygen- and nitrogen-bearing molecules and their isotopologues in a core. Oxygen-bearing molecules appear to be abundant and more complex than nitrogen-bearing species. On the other hand, the COMs detection rate steeply grows with the gas column density, which can be attributed to the effective COMs formation in dense cores.

[구 IS-05] Physical modeling of dust polarization spectrum by RAT alignment and disruption

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Dust polarization depends on the physical and mechanical properties of dust, as well as the properties of local environments. To understand how dust polarization varies with grain mechanical properties and the local environment, in this paper, we model the wavelength-dependence polarization of starlight and polarized dust emission by aligned grains by simultaneously taking into account grain alignment and rotational disruption by radiative torques (RATs). We explore a wide range of the local radiation field and grain mechanical properties characterized by tensile strength. We find that the maximum polarization and the peak wavelength shift to shorter wavelengths as the radiation strength U increases due to the enhanced alignment of small grains. Grain rotational disruption by RATs tends to decrease the optical-near infrared polarization but increases the ultraviolet polarization of starlight due to the conversion of large grains into smaller ones. In particular, we find that the submillimeter (submm) polarization degree at 850μm(P850) does not increase monotonically with the radiation strength or grain temperature (Td), but it depends on the tensile strength of grain materials. Our physical model of dust polarization can be tested with observations toward star-forming regions or molecular clouds irradiated by a nearby star, which have higher radiation intensity than the average interstellar radiation field. Finally, we compare our predictions of the P850-Td relationship with Planck data and find that the observed decrease of P850 with Td can be explained when grain disruption by RATs is accounted for, suggesting that interstellar grains unlikely to have a compact structure but perhaps a composite one. The variation of the submm polarization with U (or Td)can provide a valuable constraint on the internal structures of cosmic dust

[박 IS-06] GG Tauri A: gas properties and dynamics from the cavity to the outer disk

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