molecular clouds and observations of infall motions are needed to provide direct evidence for accretion. Combining our observation of the YSO population distribution with time scales associated with YSO evolution and HII expansion, we investigated the possible significance of triggered star formation in the molecular cloud surrounding each region.

[구 IM-08] The distribution of the molecular hydrogen in the Milky way

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We present the far-ultraviolet fluorescent molecular hydrogen (H_2) emission map observed with FIMS/SPEAR for ~76% of the sky. The fluorescent H_2 emission is found to be saturated by strong dust extinction at the optically thick, Galactic plane region. However, the extinction-corrected intensity of fluorescent H_2 emission is found to have strong linear correlations with the well-known tracers of the cold interstellar medium, such as the E(B-V) color excess, neutral hydrogen column density N(HI), Hα emission, and CO J=1→0 emission. The all-sky molecular hydrogen column density map is also obtained using a photodissociation region model. We also derive the gas-to-dust ratio, hydrogen molecular fraction (f_{H2}), and CO-to-H_2 conversion factor (X_{CO}) of the diffuse interstellar medium. The gas-to-dust ratio is consistent with the standard value 5.8×10^{21} atoms cm^{-2} mag^{-1}, and the X_{CO} tends to increase with E(B-V), but converges to the Galactic mean value 1.8×10^{20} cm^{-2} K^{-1} km^{-1} s at optically thick regions with E(B-V)>2.0.

[구 IM-09] Radiative Transfer Model of Dust Attenuation Curves in Clumpy, Galactic Environments

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The attenuation of starlight by dust in galactic environments is investigated through models of radiative transfer in a spherical, clumpy interstellar medium (ISM). We show that the attenuation curves are primarily determined by the wavelength dependence of absorption rather than by the underlying extinction (absorption+scattering) curve; the observationally derived attenuation curves cannot constrain a unique extinction curve unless the absorption or scattering efficiency is specified. Attenuation curves consistent with the Calzetti curve are found by assuming the silicate-carbonaceous dust model for the Milky Way (MW), but with the 2175Å bump suppressed or absent. The discrepancy between our results and previous work that claimed the Small Magellanic Cloud dust to be the origin of the Calzetti curve is ascribed to the difference in adopted albedos; we use the theoretically calculated albedos whereas the previous ones adopted empirically derived albedos from observations of reflection nebulae. It is found that the model attenuation curves calculated with the MW dust are well represented by a modified Calzetti curve with a varying slope and UV bump strength. The strong correlation between the slope and UV bump strength, as found in star-forming galaxies at $0.5 < z < 2.0$, is well reproduced if the abundance of the UV bump carriers is assumed to be 30-40% of that of the MW-dust; radiative transfer effects lead to shallower attenuation curves with weaker UV bumps as the ISM is more clumpy and dustier. We also argue that some of local starburst galaxies have a UV bump in their attenuation curves, albeit very weak.

[구 IM-10] Hydrodynamic simulations in the Galactic Center : Tilted HI disk

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Previous HI survey data have shown that the central HI gas in the Milky Way that resides within ~1.5 kpc of the Galactic Centre (GC) is tilted by ~15° with respect to the Galactic plane. Although several models, such as a tilted disk model, have been suggested to interpret the observed morphology of the HI layer, it is still unknown what causes and how it preserves its tilted structure. We study the behavior of a gas disk near the GC using an N-body / SPH code. Our galaxy model includes four components: nuclear bulge, bulge, disk and halo. We construct a HI model whose radius is 1.3 kpc, scale height is 100 pc and mass is 3.6×10^6 M$_\odot$. We also assume that the gas disk is initially tilted 30° with respect to the Galactic plane. Here we report our simulation results and discuss the

evolution of the tilted gas disk.

[구 IM-11] The centroid shift of Sgr A*

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The Galactic center, Sagittarius A* (Sgr A*), is the closest supermassive black hole and emits synchrotron radiation. It provides great opportunity to study the origin of mm/sub-mm emission. Currently, two competing models have been suggested as a jet base and a radiatively inecient accretion flow (RIAF). To unveil the properties, the extremely high resolution(~10μas) corresponding to the projected Schwarzschild radius of ~0.1AU is necessary. With KVN, a jet model can be tested by multi- frequency simultaneous observations because the optically thick surface in a jet (i.e. radio core) moves toward the center at a higher frequency. We conducted 8 observations with KVN at 43/86GHz in 2015, and found that the measured positional shift to the reference calibrator, J1744-3116, was ~0.3 mas to the south of Sgr A* using the source frequency phase referencing (SFPR) at Q/W bands for the first time. With the result, in the future, we will attempt to measure the variation of source position shifts that can constrain the direction of approaching jets and the variability of black hole activity of Sgr A*.

태양 및 우주환경

[박 SS-01] Statistical Studies on the Physical Parameters and Oscillations of Sunspots and Flares

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We perform three statistical studies on the physical properties and oscillations in the confined plasma such as a photospheric sunspot and confined coronal loop. From the statistical studies on the sunspot umbra and its oscillation, we find that (1) the total magnetic flux inside the umbra for the three groups increases proportionally with the powers of the umbral area and the power indices in the three groups significantly differ from each other; (2) the three groups have different characteristics in their umbral area, intensity, magnetic field strength, and Doppler velocity as well as their relationships; (3) the mean frequency of the umbral oscillations increases with the umbral mean magnetic field strength and height; (4) the time delay of the core intensity of Fe I absorption line relative to the continuum which are de-convolved with the frequency range higher than 3.5 mHz is mostly positive, implying that the photospheric umbral oscillations are likely upwardly propagating; (5) the umbral mean plasma beta ranges approximately 0.6-1.1 and does not vary significantly from pores to mature sunspots. From the comparative study on the quasi-periodic pulsations (QPPs) in the solar and stellar flares, (6) we find that the power index of the periods scaling the damping times observed in the stellar QPPs is consistent with that observed in the solar QPPs, suggesting that physical mechanisms responsible for the stellar QPPs are likely the magneto-hydrodynamic oscillation of solar coronal loops.

[구 SS-02] Anatomy of a flare-producing current layer dynamically formed in a coronal magnetic structure

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No matter how intense magnetic flux it contains, a coronal magnetic structure has little free magnetic energy when a composing magnetic field is close to a potential field, or current-free field where no volume electric current flows. What kind of electric current system is developed is therefore a key to evaluating the activity of a coronal magnetic structure. Since the corona is a highly conductive medium, a coronal electric current tends to survive without being dissipated, so the free magnetic energy provided by a coronal electric current is normally hard to release in the corona. This work aims at clarifying how a coronal electric current system is structurally developed into a system responsible for producing a flare. Toward this end, we perform diffusive MHD simulations for the emergence of a magnetic flux tube with different twist applied to it, and go