often used for describing the density structure of the youngest sources in the low mass star formation process. A Bonnor-Ebert sphere fits very well the observed SED at λ > 10 μm, suggesting that L1527 IRS might collapse from an unstable Bonnor-Ebert sphere rather than a singular isothermal sphere.

[포 IM-04] A dust continuum radiative transfer module

Seokho Lee & Jeong-Eun Lee
Kyung Hee University

We have developed a module for the dust continuum radiative transfer calculation as part of "Packages of Unified modeling for Radiative transfer, gas Energetics, and Chemistry (PUREC)". PUREC will be applied to interprete observations of protoplanetary disks. When a disk is under the hydrostatic equilibrium condition, the dust temperature and the vertical density structure should be calculated simultaneously. This module calculates the dust temperature by using the method of mean intensity (Lucy et al. 1999). In the very optically thick mid-palne, the Monte-carlo method is not efficient, thus, we apply "modified random walk" and "Partial Diffusion Approximation" to the module. The module has been verified by bechmark tests.

[포 IM-05] Self-Regulation of Star Formation Rates: an Equilibrium Vieww

Chang-Goo Kim and Eve C. Ostriker
Princeton University

In this talk, I will present a theoretical and numerical framework for self-regulation of the star formation rates (SFRs) in disk galaxies. The theory assumes (1) force balance between pressure support and the weight of the interstellar medum (ISM), (2) thermal balance between radiative cooling in the ISM and heating via FUV radiation from massive young stars, and (3) turbulent energy balance between dissipation in the ISM and driving by momentum injection of SNe. Numerical simulations show vigorous dynamics in the ISM at all times, but with proper temporal and spatial averages, all the expected balances hold. This leads to a scaling relation between mean SFRs and galactic gas and stellar properties, arising from the fundamental relationship between SFR surface density and the total midplane pressure.

[포 IM-06] Photometry of MIRIS Paschen-α blobs detected in Cepheus

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By comparing MIRIS Paschen-α (Paα) Galactic Plane Survey (MIPAPS) data with Anderson's H II region catalog (the most complete Galactic H II region catalog up to date), we confirmed Paα detections from ~50% of the H II region candidates in Cepheus (Galactic longitude from +96° to 116°). The detection of the hydrogen recombination line identifies these candidates as clear H II regions. If we extend this result to the whole plane, more than 1000 candidates are expected to be identified as H II regions. In this contribution, we present the results of quantitative estimations (brightness, size, etc.) for the Paα blobs detected in Cepheus. To obtain intensity of Paα emission line, we perform background and point spread function (PSF) matching between two filter images (line and continuum filters) as well as flux calibration.

[포 IM-07] Outburst signatures of Class I source, IRAS 16316-1540

Sung-Yong Yoon, Jeong-Eun Lee, Seokho Lee, Sunkyung Park
Kyung Hee University

We observed 10 Class I sources as part of the IGRINS (Immersion GRating INfrared Spectroscoph) Legacy Program, "IGRINS Survey of Protoplanetary Disks (PI: Jeong-Eun Lee)". Unlike other Class I sources, IRAS 16316-1540 shows broad absorption features in the near-infrared spectra (H and K bands). The broadened absorption features have been detected toward FU Orionis-type objects. Boxy or double-peaked absorption profiles can be produced by a Keplerian disk that has the hot mid-plane heated by a burst mass accretion. We could fit the broad absorption features of IRAS 16316-1540 with a K5 V template stellar spectrum convolved with a disk rotation profile of 45 km s-1. Therefore, rotationally broadened absorption features detected in this Class I source suggest that the episodic accretion process occurs from the early stage of star formation.

[포 IM-08] Statistical Analysis for Turbulence

Properties of the Orion Molecular Cloud

Hyeong-Sik Yun[1], Jeong-Eun Lee[1], Yunhee Choi[1], Seokho Lee[1], Minho Choi[2], Hyunwoo Kang[2], Ken'ichi Tatematsu[3], Stella S. R. Offner[4], Brandt A. L. Gaches[4], Mark H. Heyer[4], Neal J. Evans II[5], and Yao-Lun Yang[5],
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Turbulence plays an important role in molecular clouds. However, the properties of turbulence are poorly understood. In order to study the influence of turbulence in molecular clouds, we need to sample the turbulent properties in the full range of scales down to sonic scale. We mapped the 20'×60' area covering the Orion Molecular Cloud (OMC) 1-4 region in HCN 1-0 and HCO+ 1-0 with Taeduk Radio Astronomy Observatory (TRAO) 14-m telescope as part of the TRAO key science program, "Mapping turbulent properties of star-forming molecular clouds down to the sonic scale (PI: Jeong-Eun Lee)". In addition, we combine our TRAO data with other molecular line maps (^{13}CO 1-0, C^{18}O 1-0, CS 1-0, N_2H^+ 1-0) obtained with the Nobeyama Radio Observatory (NRO) 45-m telescope. To analyze these data, we apply statistical methods, the principal component analysis (PCA) and spectral correlation function (SCF), which are known to be useful to study underlying turbulent properties and to quantitatively characterize cloud structure. We will present the preliminary results of observations and analyses.

[포 IM-09] Infrared Study of a Low-mass Star-forming Region L1251B

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A low-mass star-forming region, L1251B, is an excellent example of a small and nearby group of protostellar objects. L1251B has been mapped spectroscopically with the Infrared Spectrograph (IRS) onboard the Spitzer Space Telescope. IRS has provided mid-IR emission lines (e.g., [Fe II], [Ne II], and ro-vibrational H2) and absorption features of CO2 and H2O ice in studying the physical state of the ionized gas and the material residing in the circumstellar environments. We will present the distribution of outflows and ice components in L1251B.

[포 IM-10] Medium Resolution Spectroscopy of Red Giant Stars in Omega Centauri

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We present chemical abundances for about 800 red giant stars in Omega Centauri, based on medium-resolution spectra obtained using Hydra multi-fiber spectrograph at the CTIO 4-m telescope. Our sample covers 14.2 < V < 15.0, and is almost unbiased against colors (and therefore metallicity). The metallicity distribution function (MDF) constructed from our data has an overall shape and local peaks that approximately match those for brighter giant stars in Johnson et al.. We also find that more metal-rich cluster members are more concentrated in the cluster center, which is consistent with previous studies. On the other hand, we find no clear evidence for such a spatial dependence with respect to alpha elemental abundance ([α/Fe]).

[포 IM-11] Calibration of Stellar Isochrones for G- and K-type Dwarfs based on High-Resolution Spectra

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