For the development of magneto rotational instability, which drives mass accretion in protoplanetary disks, sufficient ionization degree is needed. Cosmic rays are believed to be one of the dominant ionization sources for protoplanetary disk gas. In previous studies, ionization rates are computed by considering the effect of attenuation of the cosmic ray (CR) intensity as a function of column density in an unmagnetized cloud. However, in reality particles should sweep up larger column density to reach at the midplane of disk due to their gyromotion. In this study, we investigate the propagation of CR protons in a protoplanetary disk by solving transport and energy loss equations. We discuss the change in CR intensity due to magnetic field in a protoplanetary disk.

[포 IM-03] 14 Planck Galactic Cold Clumps in the λ Orionis Complex: No dense cores detected with SCUBA-2

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We present preliminary results of the submillimeter continuum observations of 14 Planck Galactic Cold Clumps (PGCCs), located in the λ Orionis Complex. This region is the nearest large HII region, which is an ideal site for a study of the stellar feedback to its surroundings. We observed 14 PGCCs with JCMT/SCUBA-2 and used J=1-0 transitions of CO isotopologues from the PMO mapping observation. Several sub-clumps toward three PGCCs were detected at 850 μm. In order to examine whether these clumps can be candidates for pre-stellar cores, we compared each clump mass calculated from the 850 μm continuum map to its Virial mass and Jeans mass calculated from the ^{12}CO and C^{18}O (1-0) spectra, respectively. All clumps have masses smaller than their Virial and Jeans masses, indicating that none of them are gravitational bound and thus in the pre-stellar core stage. Also, the CO depletion factor, which has been derived from the dust continuum and the C^{18}O(1-0) line and can be an indicator of core evolution, toward the clumps is in the range of 1 to 5, suggesting that they are not very evolved dense pre-stellar cores. In addition, within individual PGCCs, we found clear gradients of velocity (~1 km s^{-1} pc^{-1}) and temperature (~10 K pc^{-1}) in the ^{13}CO (1-0) first moment map and the ^{12}CO (1-0) excitation temperature map, respectively. This can be attributed to the compression and external heating by the HII region, which may prevent clumps from forming gravitationally bound structures and eventually disperse clumps. These results could be a hint about the negative effect of stellar feedback on core formation.

[포 IM-04] SgrA* 22/43GHz KaVA observation and its Amplitude Calibration

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\We present the results of KaVA SgrA* observation together with Takahagi(32m), Yamaguchi(32m) and Nobeyama(45m) telescopes at 22 and 43GHz, respectively. In early 2014, G2 cloud was expected to encounter with SgrA* and to make a significant flux variation, but it has not been measured yet. So it's worth to check our amplitude calibration method to confirm if we have a missing flux caused by uncertainty in measuring it. We have tested both a standard method using system noise temperature(Tsys) with antenna gain information, and a template method in order to calibrate antenna gain using nearby maser source. As a result, we found that the latter method is useful for antennas which have inaccurate gain information or poor Tsys measurements, and is especially effective for sources at low elevation like SgrA*. In addition, the comparison shows that the amplitude calibration by standard method can be improved up to 10% with a correction factor using a template method. This result implies we can get more accurate flux from a standard method when any maser source not exists around target.

천문우주 관측기술

[포 AT-01] Comparison Surface Error Measurements of Aspherical Mirror (비구면 반사경 표면의 형상오차 측정법 비교)