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Kyung Hee university invented the Transformable Reflective Telescope (TRT) for optical experiment and education. The TRT kit can transform into three optical configurations from Newtonian to Cassegrain to Gregorian by exchanging the secondary mirror. We designed the Ebert-Fastie spectrograph as an extension of the TRT kit. The primary mirror of the TRT kit serves as both collimator and camera lens, and the reflective grating as the dispersing element is placed along the optical axis of the primary mirror. We designed and fabricated the grating holder and the source units using 3D printer. Baffle was also fabricated to suppress the stray light, which was reduced by 83%. The spectrograph can observe the optical wavelength range (4000Å~7000Å). Measured resolving power ($R=\lambda/\Delta\lambda$) was ~700 with slit width of 0.18mm. The spectrograph is optimized for f/24, and the spectral pixel scale is 0.49Å/pixel with Canon 550D detector. We present the sample spectra of discharged Ne, Ar and Kr gases. The flexible setting and high performance make this spectrograph a useful tool for education and experiment.

성간물질

[구 IM-01] Characteristic Chemical Correlations in Nearby Star-forming Molecular Clouds

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Different molecular lines trace different physical environments (with various densities and temperatures) within molecular clouds (MCs). Therefore, multimolecular line observations are crucial to study the physical and chemical structures of MCs. We observed the Orion A and Ophiuchus clouds in six different molecular lines as a Taeduk Radio Astronomy Observatory Key Science Program (TRAO-KSP), "mapping Turbulent properties In star-forming MolEcular clouds down to the Sonic scale" (TIMES; PI: Jeong-Eun Lee). Here, we investigate the characteristic relations between the observed lines by performing the Principal Component Analysis (PCA). We also investigate the correlation between the line intensity distributions and the physical parameters, such as the gas column density and dust temperature. Finally, we will discuss how the correlations among different chemical tracers vary with the star formation environments

[구 IM-02] How do dense cores embedded in a pc scale filamentary clouds form, by gas flow motions along filamentary clouds and/or contracting motions by themselves?

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Understanding how the filamentary structure plays a role in the formation of the prestellar cores and stars is a key issue to challenge. We have observed two prestellar cores in surrounding filamentary environments in ^{13}CO, $C^{18}0$ (3-2) and HCO^+ (4-3) molecular lines with the Heterodyne Array Receiver Program (HARP) of the James Clerk Maxwell Telescope (JCMT), in order to search for the evidence related to the possible flow motions along the filament and/or the radial accretion (or infalling motions) of gas material toward the dense cores from their surrounding filamentary cloud. In L1544, the velocity gradient of 1.6 km s^{-1} pc^{-1} toward the core was measured in a small branch of filament lying on a radial direction of main filament while no velocity gradient along the main axis of filament in both ^{13}CO and $C^{18}O$ lines. In L694-2, we found the velocity gradient of 0.6 km s^{-1} pc^{-1} along the filament in only ^{13}CO lines. The projected accretion rate of ~6 $M_\odot$ Myr^{-1} was estimated in both cases. The infall (or radially contracting) velocity of gas material was measured ~0.16 km s^{-1} in both ^{13}CO and HCO^+ lines and in both L1544 and L694-2, which leads to estimate a mass infall rate of ~20 $M_\odot$ Myr^{-1}. Our analysis suggests that our targets are at a stage where the gravitational contraction dominates the mass accretion through the surrounding filamentary