

[☞IM-09] “Dust, Ice, and Gas In Time” (DIGIT) Herschel observations of GSS30-IRS1

Hyerin Je, Jeong-Eun Lee, DIGIT Team
School of Space Research, Kyung Hee University

As part of the DIGIT key program, we observed GSS30-IRS1, a Class I object located in Ophiuchus ($d=125$ pc), with Herschel-PACS. More than 70 lines were detected: CO lines of $J=14\rightarrow 13$ to $41\rightarrow 40$, several H_2O lines of $E_u=100$ to 1500 K, 16 OH lines, and two atomic [OI] lines at 63 and 145 μm . All lines, except for [OI], were detected only at the central spaxel of $9.4''\times 9.4''$ while the [OI] emission is extended along the NE-SW direction. One interesting feature in GSS30-IRS1 is that the continuum is extended beyond PSF, unlike the line emission. For detail analysis, we apply the non-LTE LVG model, RADEX as well as simple rotational diagrams to the detected line fluxes. We will discuss about the physical conditions around GSS30-IRS1, learned by the line flux analysis.

[☞IM-10] HCN and HNC abundance ratio toward three different phases of massive star formation

Mi-Hwa Jin¹, Jeong-Eun Lee¹, Kee-Tae Kim²
¹*School of Space Research, Kyung Hee University*
²*Korea Astronomy and Space Science Institute(KASI)*

In the process of star formation, the density and temperature of associated material, which are the physical conditions for the molecular chemistry, vary dramatically. As a result, the connection between physical and chemical conditions has been used to trace the evolutionary stages in star formation. One chemical tracer for the physical conditions in star forming material is the [HCN]/[HNC] abundance ratio since the ratio strongly depends on the kinetic temperature in molecular clouds. Here we investigate the [HCN]/[HNC] abundance ratios in objects related to the massive star formation.

For the investigation, we carried out $H^{13}CN$ and $HN^{13}C$ line observation toward objects in three different evolutionary stages of massive star formation: Infrared dark clouds (IRDCs), High-mass protostellar object (HMPOs), and Ultra-compact HII regions (UCHIIs). According to our observational results, both $H^{13}CN$ and $HN^{13}C$ lines have been detected toward 19 IRDCs, 25 HMPOs, and 31 UCHIIs. We will discuss about the [HCN]/[HNC] abundance ratios in different evolutionary stages of massive star formation and associate the results with the physical conditions of the targets.