

Spectral Line Survey toward NGC 2264 CMM3 with ALMA

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NGC2264 CMM3 is a massive protostellar core associated with a very young outflow (Saruwatari et al. 2011). According to the theoretical prediction (Maury et al. 2009), a protostar in this source will evolve into a main-sequence star with 8 Msun. In order to explore the chemical composition of this high-mass protostellar candidate in the earliest evolutionary phase, we conducted a spectral line survey with the Nobeyama 45 m telescope and the ASTE 10 m telescope in the 4, 3, and 0.8 mm bands (Watanabe et al. 2015). Carbon-chain molecules are found to be abundant in this source, whereas saturated complex organic molecules and S-bearing molecules are deficient. This result confirms chemical youth of the source.

Recently, we conducted a spectral line survey in the 0.8 mm band toward NGC2264 CMM3 with ALMA at an angular resolution of $0.3''$ - $0.9''$. As the result, this source is found to be a binary (A and B) separated by 660 au (Figure 1 Left). Furthermore, the binary is surrounded by 4 isolated continuum peaks, which are likely low-mass young stellar objects. CMM3A is very rich in molecular lines, as shown in Figure 1 Right), and possesses a hot core. On the other hand, CMM3B is rather deficient in molecular lines. This distinct chemical differentiation would originate from the different ages and/or the different temperatures of these two sources. This result will give us an important constraint on the mechanism of cluster/binary formation in this region.

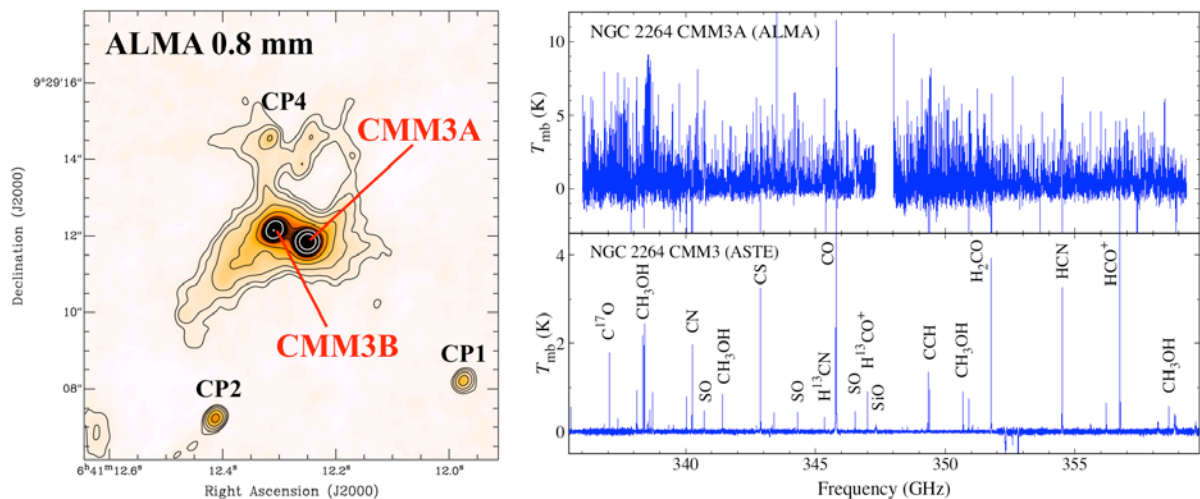


Figure 1: (Left) Continuum map observed with ALMA in the 0.8 mm band around CMM3. (Right) Spectra in the CMM3A observed the ALMA (Top) and that observed with the ASTE 10 m telescope (Bottom).

References

- [1] Maury et al., 2009, A&A, 499, 175.
- [2] Saruwatari et al. 2011, ApJ, 729, 147.
- [3] Watanabe et al. 2015, ApJ, 809, 162.