

Line survey of RCrA IRAS7B in the 345GHz window with ASTE

Y. Watanabe¹, N. Sakai¹, S. Yamamoto¹, J. Lindberg², J. Jørgensen², S. Bisschop²

¹Department of Physics, the University of Tokyo, Japan

²University of Copenhagen, Denmark

Recently it is established that chemical compositions of low mass star forming regions harboring the Class 0 protostar are different from source to source ([1], [2], [3] etc.). One extreme case is a hot corino, where various complex organic molecules like HCOOCH₃ are abundant. These complex molecules may be related to the pre-solar material found in meteorites. Therefore it is very important to characterize the chemical compositions of the hot corinos and its variation in detail. However, a line survey toward a hot corino source is carried out only toward IRAS 16293-2422, and it has not been published yet.

With these in mind, we have conducted a sensitive line survey in the 345 GHz band toward RCrA IRS7B with the ASTE 10 m telescope. RCrA IRS7B is a class 0 object in Corona Australis with the distance of about 170 pc [4]. Schoier et al. [5] detected the high excitation lines of H₂CO and CH₃OH toward this source, indicating that it is a good candidate of the hot corino source.

The RCrA IRS7B has been surveyed from 332 GHz to 352 GHz with frequency resolution of 0.5 MHz. The typical R.M.S. noise level is 10-15 mK in T_A^* . From the survey, we have identified 15 fundamental molecular species and 11 isotopomers. On the other hand, complex organic molecules, which consists of more than 4 heavy atoms, have not been detected definitively. In our poster, we will present the current results of our survey (fig.1 a) and discuss physical conditions of molecular gas (fig.1 b) and deuterium fractionation ratio in the source. This is a collaborative study with the University of Copenhagen group, which is conducting the line survey in the 230 GHz band toward the same source with APEX.

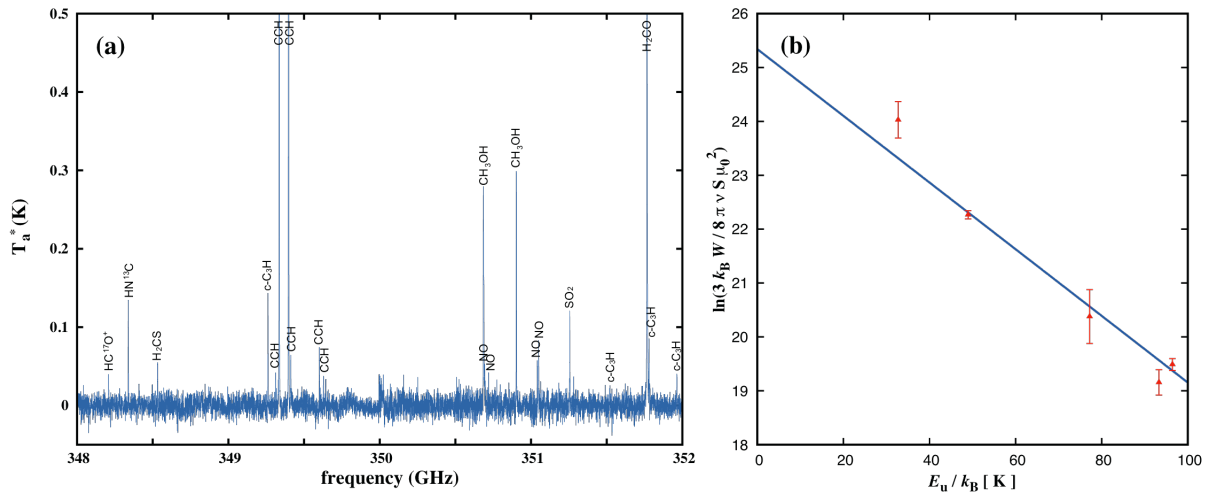


Figure 1: (a) A portion of obtained spectra from 348GHz to 352 GHz. (b) An example of the rotation-diagram analysis for c-C₃H₂. The estimated excitation temperature (T_{rot}) and column density (N) are 16.2 ± 1.2 K and $(4.0 \pm 1.3) \times 10^{12}$ cm⁻², respectively.

References

- [1] Schoier et al. 2002., A&A, 390, 1001
- [2] Cazaux et al. 2003., ApJ, 593, L51
- [3] Sakai et al. 2008., ApJ, 672, 371
- [4] Kunde & Høg 1988., A&A, 338, 897
- [5] Schoier et al. 2006, 454, L67