Measurements of Microwave Spectra of Methanol Isotopologues in ALMA Band 6 Frequency Range

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In radio astronomy, accurate rest frequencies of molecular transitions are indispensable for secure identification of molecular species and accurate analyses of Doppler shifts caused by motions of the target sources. In observations, we have seriously realized the importance of the accurate rest frequencies of molecular transitions [cf; 1-4]. By strong lines, we can discuss gas motions in detail, and can set the velocity of the target system to the Solar system. As demonstrated in many sources, velocity analysis not only tells us kinematics of the system but also excitation condition of the gas on the corresponding position [cf; 5]. Accurate rest-frequencies of lines are therefore indispensable for such astronomical studies.

Methanol is a fundamental saturated-organic molecule and known to be abundant in star forming regions. It is thought to be formed on grain surface through hydrogenation reactions of adsorbed CO molecule. Since methanol can be a parent of more complex organic molecules (COMs), tracing it's abundance along protoplanetary-disk formation is important to understand origin of the chemical complexity in the Solar system. Especially isotopic ratios of molecules tell us critical information about their formation pathways. With these in mind, we have measured rotation spectra of methanol isotopologues by using SUMIRE (Emission type microwave spectrometer developed in RIKEN, [6]) in the frequency range corresponding to ALMA Band 6 (215-265 GHz). A portion of the results will be presented.

References

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