

# Laboratory Millimeter-Wave Spectroscopy of Organic Molecule of Astrophysical Importance

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Molecules are present in several astrophysical objects, particularly in dense and cool regions where star formation occurs and in circumstellar envelopes around dying stars. Among them, there are fairly large (from an astronomer's point of view) molecules containing the element carbon, that is organic species [1]. Most of them have been detected in the gas phase by radio telescopes, relying on the rest frequencies obtained in laboratory through the detection of their rotational spectra.

The data provided by the Herschel Space Observatory and observations now carried out with ALMA require extensive laboratory measurements in the millimeter and submillimeter-wave regions, which can be accomplished by the source-modulation microwave spectrometer working in Bologna. Recently, the rotational spectra of two imines produced by pyrolysis have been studied: methanimine ( $\text{CH}_2\text{NH}$ ) and ketenimine ( $\text{CH}_2\text{CNH}$ ); imines are precursors of biomolecules, since they participate in the Strecker synthesis to form nitriles, which are intermediates for the synthesis of amino acids via hydrolysis of the nitrile. Other two organic molecules under study are acrylic acid ( $\text{CH}_2\text{CHCOOH}$ ) and propargylamine ( $\text{C}_3\text{H}_3\text{NH}_2$ ), still unobserved in the interstellar medium or in circumstellar envelopes, for which accurate predictions of rotational lines are needed. This contribution will review the spectroscopical studies of the above mentioned molecules of astrophysical importance.

[1] E. Herbst & E.F. van Dishoeck, 2009, *Annu. Rev. Astron. Astrophys.*, 47, 427

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