

# Laboratory Spectroscopy of Interstellar Molecules

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The process of star formation is accompanied with a rich gas phase chemistry. More than 120 molecules have been detected in the interstellar medium and the circumstellar shells of late type stars. Many of these molecules are so called “transient species,” which are extremely reactive and unstable under laboratory conditions. In recent years laboratory techniques have been developed to produce these molecules and to study them in great detail. High resolution spectroscopy has been proven to be a powerful tool to characterize and to detect new species in the interstellar space once their spectra are known from the laboratory.

Many of the molecules which might be important for astro-chemistry have characteristic spectra in the terahertz frequency region (60-300  $\mu\text{m}$ ), among them the centro- symmetric carbonaceous chain and ring molecules which have no pure rotational spectra but low lying bending and ring puckering modes. Since the Earth’s atmosphere is opaque for terahertz frequencies these transitions can only be observed from satellite instruments as the HIFI spectrometer on board the HERSCHEL satellite or from air borne telescopes like SOFIA.

Laboratory methods of producing and characterizing molecules of astrophysical relevance will be presented and discussed.