

THE (SUB-)MILLIMETER-WAVE SPECTRUM OF PROPANAL

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The microwave spectrum of propanal, also known as propionaldehyde, $\text{CH}_3\text{CH}_2\text{CHO}$, has been investigated in the laboratory already since 1964¹ and has also been detected in space². Recently, propanal was detected with the Atacama Large Millimeter/submillimeter Array (ALMA), Protostellar Interferometric Line Survey (PILS)³. The high sensitivity and resolution of ALMA indicated small discrepancies between observed and predicted rotational spectra of propanal. As higher accuracies are desired the spectrum of propanal was measured up to 500 GHz with the Cologne (Sub-)Millimeter spectrometer. Propanal has two stable conformers, *syn* and *gauche*, which differ mainly in the rotation of the aldehyd group with respect to the rigid C-atom framework of the molecule. We extensively studied both of them. The lower *syn*-conformer shows small splittings caused by the internal rotation of the methyl group, whereas the spectrum of *gauche*-propanal is complicated due to the tunneling rotation interaction from two stable degenerate conformers. Additionally, we analyzed vibrationally excited states.

¹ Butcher et al., *J. Chem. Phys.* **40** 6 (1964)

² Hollis et al., *Astrophys. J.* **610** L21 (2004)

³ Lykke et al., *A&A* **597** A53 (2017)