DOPPLER-FREE SATURATED ABSORPTION SPECTROSCOPY OF CH_4 IN THE MID-INFRARED REGION USING A CONTINUOUS-WAVE OPTICAL PARAMETRIC OSCILLATOR

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The fundamentals of XH stretching modes typically lie in the 2,500 – 3,700 cm^{-1} (2.7 - 4.0 μm) range. Continuous-wave optical parametric oscillators (CW OPOs) enable high-resolution spectroscopy in this region. A Doppler-free saturated absorption spectroscopy apparatus with a high-power, widely tunable CW OPO as the light source has been built in our lab for high-resolution, high-precision spectroscopy of gas-phase molecules. We have obtained the Doppler-free spectrum of the Q branch of the ν_3 band of CH_4 in a proof-of-principle experiment. Preliminary results from the experiment will be reported in this talk. A cavity-enhanced two-photon spectroscopy setup using the same CW OPO is under construction.