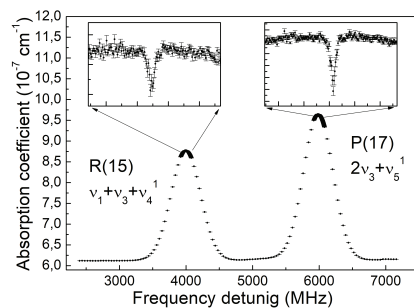


FREQUENCY COMB ASSISTED, CAVITY RING-DOWN, LAMB-DIP SPECTROSCOPY OF ACETYLENE AT 1.39 μm .

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Doppler-free saturated-absorption Lamb dips were observed for weak vibration-rotation transitions of acetylene between 7167 and 7217 cm^{-1} , using frequency comb assisted cavity ring-down spectroscopy. We measured the absolute center frequency of 16 lines of the $2\nu_3+\nu_5^1$ band, targeting *ortho* and *para* states of the molecule. Line pairs of the P and Q branches were selected so as to form a V-scheme, sharing the lower energy level. Such a choice made it possible to determine the rotational energy separations of the excited vibrational state for J-values from 11 to 20. The spectrometer is an upgraded version of that described by Fasci *et al.*^c, the main novelty being the use of a BOA - Booster Optical Amplifier, to increase the optical power injected into the high-finesse cavity. Our data provide a very stringent test of the MARVEL analysis recently performed on acetylene^d. Figure on the right reports an example of observed Lamb dips recorded in correspondence of the line doublet already exploited for low-uncertainty Doppler-broadening gas thermometry^e.



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