

Abstract Submitted  
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**Experimental determination of the Herman-Wallis factor of Q-branch Raman transitions** MICHELE MARROCCO, ENEA — Vibration-rotation interaction is crucial to the accurate understanding of spectroscopic line intensities of light molecules. The interaction is quantified by the so-called Herman-Wallis (HW) factor  $F$  [J. Chem. Phys. 23, 637 (1955)] whose calculation is debatable for Q-branch transitions. Indeed, different authors have suggested different HW factors in manifest disagreement with each other. To clarify this matter, an experiment based on vibrational coherent anti-Stokes Raman spectroscopy (CARS) applied to H<sub>2</sub> molecules has been realized. The idea behind this experimental proof is very simple. First of all, the spectra have been acquired from a very stable adiabatic H<sub>2</sub>/air flame, whose temperature is well known. In this way, the optical nonlinearity and the high temperature have enhanced the dependence of the data on the factor  $F$ . Secondly, the determination of the best expression for  $F$  has been based on the comparison of the measured line Q(7) with calculated line strengths obtained from the HW factors found in literature. The sole HW factor that justifies the experimental data is given in the work of Tipping and Bouanich [J. Quant. Spectrosc. Radiat. Transfer 71, 99 (2001)].

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