FERMI MIXING AND FORBIDDEN TRANSITIONS IN METHANOL-D_1 AND CONFIRMATION OF OPTICALLY PUMPED FAR-INFRARED LASER LINES

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This paper reports ”Forbidden” transitions in the Fourier transform infrared (FTIR) spectrum, involving highly excited torsional levels within the ground vibrational state for dK_p=0, K_p=4, of methanol- D_1 (CH_2DOH) which become allowed through ”Fermi” interaction with the OCD-bending vibrational state. This is the first time such transitions have been detected for any asymmetric- asymmetric molecule. The present findings represent a breakthrough in the assignment processfor asymmetrically substituted methanol, providing ample data for modeling of the Hamiltonian of the molecule. The findings are consistent with the far-infrared (FIR) laser lines pumped by P(46) CO_2 laser line of the 10.6 m band in CH_2DOH, which was earlier associated with an upshifted infrared (IR) transition but until now the mechanism of the anomalous shift remained a mystery. The results will be discussed in terms of the ”Fermi” interaction and closed combination loops. Comments will be made on the internal rotational potential energy coefficients.