

OBSERVATION OF ArHF(3001) \leftarrow (0001), (3101) \leftarrow (0001) AND (3111) \leftarrow (0001) HOT BAND TRANSITIONS NEAR 11400 cm^{-1}

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We present the spectra of three hot band transitions of ArHF (3001) \leftarrow (0001), (3101) \leftarrow (0001) and (3111) \leftarrow (0001) near 11400 cm^{-1} obtained by intracavity laser induced fluorescence. The spectroscopic constants of these transitions are determined to be $\nu_0 = 11347.2426(2) \text{ cm}^{-1}$, $11405.5718(6) \text{ cm}^{-1}$, $11417.3888(6) \text{ cm}^{-1}$ and $B=0.095546(32) \text{ cm}^{-1}$, $0.090617(37) \text{ cm}^{-1}$, $0.090827(15) \text{ cm}^{-1}$, respectively. Of particular importance is the (3001) \leftarrow (0001) hot band transition, as it precisely determines the vdW stretching frequency of 46.894 cm^{-1} for ArHF at $\nu_{HF}=3$. The vdW stretching frequency increases 21.2% upon HF $\nu=3\leftarrow 0$ valence excitation. The present experimental results are in reasonable agreement with predictions by Hutson's ArHF H(6,4,2) potential.^a A high-level 3-dimensional *ab initio* ArHF potential with H-F distances ranging from 0.7–1.9 Å will be presented. Recent progress in the determination of HF product rotational state distribution of HF-complexes at $\nu_{HF}=3$ following the vibrational predissociation, using a newly constructed Michelson interferometer in conjunction with intracavity laser fluorescence, will be also presented.

^aH.-C. Chang, F.-M. Tao, W. Klemperer, C. Healey, and J. M. Hutson, *J. Chem. Phys.* **99**, 9337 (1993)