H_2-H_2O H_2O

( ) T. Giesen C. J. Whitham

Millimeter Wave Spectroscopy of the internal rotation excited state of H_2-H_2O.

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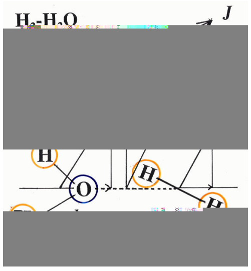
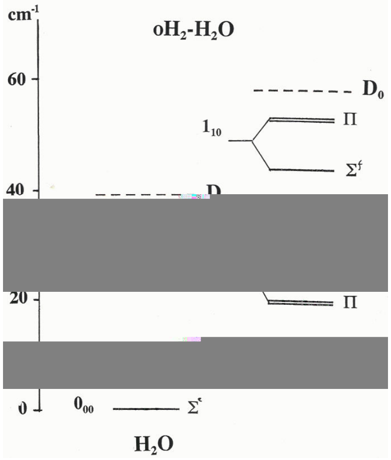
The rotational transitions of the internal rotation excited state of the ortho-Hydrogen water complex have been observed by the millimeterwave spectroscopy combined with the supersinic expansion technique. The Coliolis interaction between the Σ and Π substate in the H_2O, 1_{01} internal rotation state have been analyzed and effective molecular constants were determined for these states.



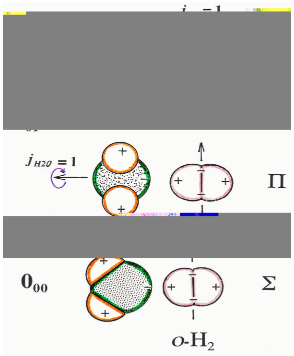
H_2-H_2O 1 D_e = 40 cm^{-1}
1) H_2 H_2O
H_2 j_{H2} k_{H2}
j_{H2} = 1
| |= 0 1 0 1.



.(o)H_2-H_2O

H_2O $j_{Ka,Kc}$
D_0 1_{01} 1_{10}
H_2O k_{H2O}
Π Σ 0_{00} 1_{01}
j_{H2} = 1 k_{H2} = 0
P_z
0_{00}
1_{01} c
Π Σ

$ν_2$
Weida Nesbit 1) $ν_2$
1_{01}, Σ 1_{01}, Π 10.548(2)cm^{-1}
1_{01}, Σ 1_{01}, Π
10cm^{-1} 1_{01}-0_{00}
0_{00} 1_{01}
Π 0_{00}
1_{01} Π 2)
1_{01} Σ



(o)H_2-H_2O

Ne H_2 = 3 1 15

H_2O

50Hz

10 H_2-H_2O

1_{01} Σ

95-99 GHz 142-145 GHz 183-187GHz

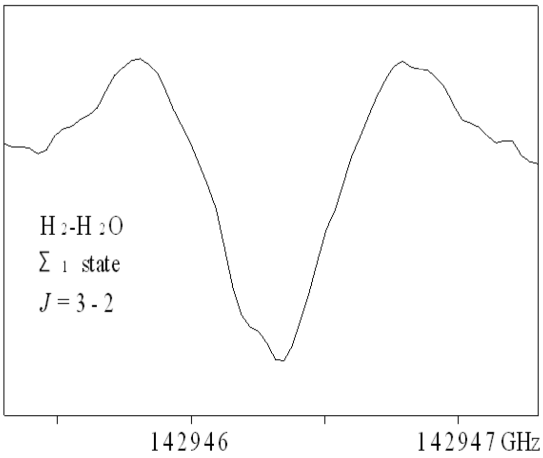
J = 2 - 1, 3 - 2, 4 - 3

(o)H_2-H_2O(Ground,1_{01}, Σ)

J = 3 - 2 .4 400kHz

S/N=10 1_{01} Π

1/10



. (o)H_2-H_2O, 1_{01}

	Σ_1, Π_1	
$\Delta_{\Sigma\Pi}$	316.224(fixed)	GHz
B_Σ	21221.003(42)	MHz
D_Σ	17.5828(44)	MHz
β_0	35036.06(22)	MHz
β_D	30.003(29)	MHz
B_Π	21304.815(19)	MHz
D_Π	9.7470(24)	MHz

1_{01} Σ Π_e

Σ

Π_e 4 Π_f

6 Π Σ

Σ-Π

Σ-Π $\Delta_{\Sigma\Pi}$

ν_2

(o)H_2-H_2O

Σ-Π $\Delta_{\Sigma\Pi}$

Σ-Π 300GHz

Σ-Π_f Q(1) Π_f-Π_e Q(1) 7%

Σ-Π

1_{10} a

Π Σ 1_{10}-1_{01}

b-type 1_{01}, Π 1_{10}, Σ Π

25cm^{-1} 35cm^{-1} 1)

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[1] M. J. Weida and D. J. Nesbit, *J. Chem. Phys.* **110**, 156 (1999).

[2] C. J. Whitham, K. Harada, and K. Tanaka, , 1P66, (2000) .