Supplementary Information for

Methanol as a sensitive probe for spatial and temporal variations of the proton-to-electron mass ratio

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Transition, J_K	Transition (MHz)		K_μ
	Experiment	BELGI	
$1_1 \to 1_1 A^{\mp}$	834.267(2)	834.280	−1.03(5)
$3_1 \to 3_1 A^{\mp}$	5 005.32079(20)	5 005.302	−1.03(5)
$5_1 \to 6_0 A^{+}$	6 668.5192(8)	6 668.567	−42.(2)
$9_{-1} \to 8_{-2} E$	9 936.202(4)	9 936.137	11.5(6)
$2_0 \to 3_{-1} E$	12 178.597(4)	12 178.587	−33.(2)
$2_1 \to 3_0 E$	19 967.3961(2)	19 967.376	−5.9(3)
$9_2 \to 10_1 A^{+}$	23 121.0242(5)	23 120.916	−11.7(6)
$3_2 \to 3_1 E$	24 928.707(7)	24 928.726	17.9(9)
$4_2 \to 4_1 E$	24 933.468(2)	24 933.502	17.9(9)
$2_2 \to 2_1 E$	24 934.382(5)	24 934.399	17.9(9)
$5_2 \to 5_1 E$	24 959.0789(4)	24 959.120	17.9(9)
$6_2 \to 6_1 E$	25 018.1225(4)	25 018.173	17.8(9)
$7_2 \to 7_1 E$	25 124.8719(4)	25 124.929	17.7(9)
$8_2 \to 8_1 E$	25 294.4165(2)	25 294.480	17.6(9)
$9_2 \to 9_1 E$	25 541.3979(4)	25 541.464	17.3(9)
$10_2 \to 10_1 E$	25 878.2661(4)	25 878.334	17.0(9)
$12_2 \to 12_1 E$	26 847.233(50)	26 847.296	16.2(8)
$13_2 \to 13_1 E$	27 472.531(30)	27 472.581	15.7(8)
$14_2 \to 14_1 E$	28 169.462(30)	28 169.502	15.1(8)
$15_2 \to 15_1 E$	28 905.812(30)	28 905.833	14.5(7)
$8_2 \to 9_1 A^{-}$	28 969.942(50)	28 969.965	−9.5(5)
$16_2 \to 16_1 E$	29 636.936(10)	29 636.948	14.0(7)
$17_2 \to 17_1 E$	30 308.034(10)	30 308.026	13.4(7)
$4_{-1} \to 3_0 E$	36 169.265(30)	36 169.259	9.7(5)
$7_{-2} \to 8_{-1} E$	37 703.700(30)	37 703.761	−4.3(2)
$6_2 \to 5_3 A^{+}$	38 293.268(50)	38 293.273	−15.1(8)
$6_2 \to 5_3 A^{-}$	38 452.677(50)	38 452.632	−15.0(8)
$7_0 \to 6_1 A^{+}$	44 069.410(10)	44 069.364	5.2(3)
$5_{-1} \to 4_0 E$	84 521.169(10)	84 521.169	3.6(2)
$7_2 \to 6_3 A^{-}$	86 615.600(5)	86 615.578	−7.2(4)
$7_2 \to 6_3 A^{+}$	86 902.949(5)	86 902.919	−7.2(4)
$8_0 \to 7_1 A^{+}$	95 169.463(10)	95 169.388	1.88(9)
$11_{-1} \to 10_{-2} E$	104 300.414(7)	104 300.334	0.18(5)
$3_1 \to 4_0 A^{+}$	107 013.803(5)	107 013.836	−3.6(2)
$0_0 \to 1_{-1} E$	108 893.963(7)	108 893.948	−4.6(2)
$6_{-1} \to 5_0 E$	132 890.692(10)	132 890.759	1.9(1)
$9_0 \to 8_1 A^{+}$	146 618.794(50)	146 618.696	0.87(5)
$8_0 \to 8_{-1} E$	156 488.868(10)	156 488.905	−3.5(2)
$2_1 \to 3_0 A^{+}$	156 602.413(10)	156 602.400	−2.8(1)
$7_0 \to 7_{-1} E$	156 828.533(10)	156 828.520	−3.5(2)
$6_0 \to 6_{-1} E$	157 048.625(10)	157 048.621	−3.5(2)
$5_0 \to 5_{-1} E$	157 179.017(10)	157 178.991	−3.5(2)
$4_0 \to 4_{-1} E$	157 246.056(10)	157 246.066	−3.5(2)
$1_0 \to 1_{-1} E$	157 270.851(10)	157 270.836	−3.5(2)
$3_0 \to 3_{-1} E$	157 272.369(10)	157 272.342	−3.5(2)
$2_0 \to 2_{-1} E$	157 276.058(10)	157 276.023	−3.5(2)
$8_{-1} \to 7_0 E$	229 758.760(50)	229 758.757	0.68(5)

Table I. Methanol ($^{12}CH_3^{16}OH$) maser transitions and accurate rest frequencies taken from Table 1 of Müller *et al.* [4]. The third column shows the calculated frequencies using the constants listed in Table III. In the fourth column the sensitivity coefficients, K_μ, of the transitions are listed. The K_μ-coefficients are obtained by scaling the 119 molecular constants using the relations listed in Table III. The error in the last digit of the K_μ-coefficients are quoted in brackets, and is conservatively taken to be 5% if $K_\mu \geq 1$ or 0.05 if $K_\mu < 1$. The error in the sensitivity coefficients has 3 sources: (i) errors due to the uncertainty in the determination of the molecular constants. As the simulations reproduce almost all transitions <50 kHz for $^{12}CH_3^{16}OH$, this error is negligible small. (ii) Errors due to inexactness of the scaling relations of higher order constants. Many of the higher-order constants are products of torsional and rotational operators and can be considered as effective constants after the van Vleck transformations of the vibration-rotation-torsion Hamiltonian [3]. These higher order parameters may also be fairly correlated. Therefore, the exact relationships between the higher order parameters and the moments of inertia (and masses) are not obvious. As a check we have calculated the K_μ coefficients by scaling only the first 7, or the first 31 constants of the parameters listed in Table III. The obtained K_μ coefficients when scaling 7 or 31 constants typically agree within 5% or 0.5% of those obtained when all 119 constants are scaled, respectively. Thus, even if the scaling relations of the higher order constants are not exact, the effect of these on the obtained K_μ coefficients is small. (iii) Errors due to neglecting the μ dependence of the torsional potential. Within the Born-Oppenheimer approximation the torsional potential, V_3, is independent of the mass of the nuclei and hence of μ. It is known however that V_3 does vary between isotopologues. For instance for $^{12}CH_3^{16}OH$ the torsional potential $V_3 \approx 373\,\mathrm{cm}^{-1}$, and for $^{12}CD_3^{16}OD$ $V_3 \approx 362\,\mathrm{cm}^{-1}$. A reliable model for this variation is not available. As a check, we have assumed V_3 to be a linear function of $I_{red} = I_{a1}I_{a2}/I_a$; $V_3{=}V_3(^{12}CH_3^{16}OH) - 19.4(I_{red} - I_{red}(^{12}CH_3^{16}OH))$. As I_{red} is directly proportional to μ, this introduces a μ dependence in the potential. We found that the K_μ coefficients calculated by including the linear scaling for V_3 are typically 3% smaller than those obtained when the potential is assumed to be independent of μ.

Transition, J_K	Transition (MHz)		K_μ
	Experiment	BELGI	
$1_1 \rightarrow 1_1 A^{\mp}$	834.267(2)	834.280	−1.03(5)
$2_1 \rightarrow 2_1 A^{\mp}$	2502.7785(10)	2502.768	−1.03(5)
$3_1 \rightarrow 3_1 A^{\mp}$	5005.32079(20)	5005.302	−1.03(5)
$2_0 \rightarrow 3_{-1} E$	12178.595(3)	12178.587	−33.(2)
$2_1 \rightarrow 3_0 E$	19967.3961(2)	19967.376	−5.9(3)
$2_2 \rightarrow 2_1 E$	24934.382(5)	24934.400	17.9(9)
$4_{-1} \rightarrow 3_0 E$	36169.265(30)	36169.259	9.7(5)
$1_0 \rightarrow 0_0 A^+$	48372.4558(7)	48372.460	−1.00(5)
$1_0 \rightarrow 0_0 E$	48376.892(10)	48376.887	−1.00(5)
$1_0 \rightarrow 2_{-1} E$	60531.489(10)	60531.477	−7.4(4)
$1_1 \rightarrow 2_0 E$	68305.640(20)	68305.629	−2.4(1)
$2_1 \rightarrow 1_1 A^+$	95914.309(5)	95914.311	−1.00(5)
$2_{-1} \rightarrow 1_{-1} E$	96739.362(5)	96739.359	−1.00(5)
$2_0 \rightarrow 1_0 A^+$	96741.375(5)	96741.372	−1.00(5)
$2_0 \rightarrow 1_0 E$	96744.550(5)	96744.546	−1.00(5)
$2_1 \rightarrow 1_1 E$	96755.511(5)	96755.502	−1.00(5)
$2_1 \rightarrow 1_1 A^-$	97582.804(7)	97582.799	−1.00(5)
$3_1 \rightarrow 4_0 A^+$	107013.803(5)	107013.836	−3.6(2)
$0_0 \rightarrow 1_{-1} E$	108893.963(7)	108893.948	−4.6(2)
$2_2 \rightarrow 1_1 E$	121689.975(10)	121689.901	2.9(1)
$3_1 \rightarrow 2_1 A^+$	143865.801(10)	143865.796	−1.00(5)
$3_0 \rightarrow 2_0 E$	145093.707(10)	145093.755	−1.00(5)
$3_{-1} \rightarrow 2_{-1} E$	145097.370(10)	145097.436	−1.00(5)
$3_0 \rightarrow 2_0 A^+$	145103.152(10)	145103.186	−1.00(5)
$3_1 \rightarrow 2_1 E$	145131.855(10)	145131.865	−1.00(5)
$3_1 \rightarrow 2_1 A^-$	146368.342(50)	146368.329	−1.00(5)
$2_1 \rightarrow 3_0 A^+$	156602.413(10)	156602.400	−2.8(1)
$1_0 \rightarrow 1_{-1} E$	157270.851(10)	157270.836	−3.5(2)
$3_0 \rightarrow 3_{-1} E$	157272.369(10)	157272.342	−3.5(2)
$2_0 \rightarrow 2_{-1} E$	157276.058(10)	157276.023	−3.5(2)
$1_1 \rightarrow 1_0 E$	165050.195(10)	165050.175	−1.59(8)
$2_1 \rightarrow 2_0 E$	165061.156(10)	165061.131	−1.59(8)
$3_1 \rightarrow 3_0 E$	165099.271(10)	165099.241	−1.59(8)
$3_2 \rightarrow 2_1 E$	170060.581(10)	170060.591	1.77(9)
$4_1 \rightarrow 3_1 A^+$	191810.509(10)	191810.504	−1.00(5)
$4_0 \rightarrow 3_0 E$	193415.367(10)	193415.325	−1.00(5)
$4_{-1} \rightarrow 3_{-1} E$	193441.610(10)	193441.601	−1.00(5)
$4_0 \rightarrow 3_0 A^+$	193454.361(10)	193454.360	−1.00(5)
$4_1 \rightarrow 3_1 A^-$	195146.760(10)	195146.792	−1.00(5)

Table II. Accurately known methanol ($^{12}CH_3^{16}OH$) transitions and corresponding frequencies detected or potentially detectable in dark clouds taken from Table 2 of Müller *et al.* [4]. The third column shows the calculated frequencies using the constants listed in Table III. In the fourth column the sensitivity coefficients, K_μ, of the transitions are listed. The K_μ-coefficients are obtained by scaling the 119 molecular constants using the relations listed in Table III. The error in the last digit of the K_μ-coefficients are quoted in brackets, and is conservatively taken to be 5% if $K_\mu \geq 1$ or 0.05 if $K_\mu < 1$.

Term order $\{nlm\}$	Operator	Parameter		$^{12}CH_3^{16}OH$	μ dependence
		In BELGI	Literature		
{220}	P_γ^2	FPARA	F	27.64684641(28)	μ^{-1}
	$(1-\cos 3\gamma)/2$	V3	V_3	373.554746(12)	μ^0
{211}	$P_\gamma P_a$	RHORHO	ρ	0.8102062230(37)	μ^0
{202}	P_a^2	OA	A	4.2537233(71)	μ^{-1}
	P_b^2	B	B	0.8236523(70)	μ^{-1}
	P_c^2	C	C	0.7925575(71)	μ^{-1}
	$\{P_a, P_b\}$	DAB	D_{ab}	−0.0038095(38)	μ^{-1}
{440}	P_γ^4	AK4	$F_m(k_4)$	$-8.976763(48)\times10^{-3}$	μ^{-2}
	$(1-\cos 6\gamma)/2$	V6	V_6	−1.319650(85)	μ^0
{431}	$P_\gamma^3 P_a$	AK3	$\rho_m(k_3)$	$-3.504714(14)\times10^{-2}$	μ^{-1}
{422}	$P_\gamma^2 P^2$	GV	$F_J(G_v)$	$-1.373(31)\times10^{-4}$	μ^{-2}
	$P_\gamma^2 P_a^2$	AK2	$F_K(k_2)$	$-5.188031(18)\times10^{-2}$	μ^{-2}
	$P_\gamma^2\{P_a, P_b\}$	DELTA	$F_{ab}(\Delta_{ab})$	$3.112(23)\times10^{-3}$	μ^{-2}
	$2P_\gamma^2(P_b^2-P_c^2)$	C1	$F_{bc}(c_1)$	$-0.1955(97)\times10^{-4}$	μ^{-2}
	$(1-\cos 3\gamma)P^2$	FV	$V_{3J}(F_v)$	$-2.4324(69)\times10^{-3}$	μ^{-1}
	$(1-\cos 3\gamma)P_a^2$	AK5	$V_{3K}(k_5)$	$1.117844(23)\times10^{-2}$	μ^{-1}
	$(1-\cos 3\gamma)\{P_a, P_b\}$	ODAB	$V_{3ab}(d_{ab})$	$9.07791(65)\times10^{-3}$	μ^{-1}
	$(1-\cos 3\gamma)(P_b^2-P_c^2)$	C2	$V_{3bc}(c_2)$	$-8.698(21)\times10^{-5}$	μ^{-1}

(continued on next page)

Term order $\{nlm\}$	Operator	Parameter In BELGI	Parameter Literature	$^{12}CH_3^{16}OH$	μ dependence
	$\sin 3\gamma\{P_a, P_c\}$	DAC	$D_{3ac}(D_{ac})$	$5.177(29) \times 10^{-2}$	μ^{-1}
	$\sin 3\gamma\{P_b, P_c\}$	DBC	$D_{3bc}(D_{bc})$	$0.538(12) \times 10^{-3}$	μ^{-1}
$\{413\}$	$P_\gamma P_a P^2$	ALV	$\rho_J(L_v)$	$-2.305(54) \times 10^{-4}$	μ^{-1}
	$P_\gamma P_a^3$	AK1	$\rho_K(k_1)$	$-3.4254(13) \times 10^{-2}$	μ^{-1}
	$P_\gamma(P_a^2 P_b + P_b P_a^2)$	ODELTA	$\rho_{ab}(\delta_{ab})$	$4.496(33) \times 10^{-3}$	μ^{-1}
	$P_\gamma\{P_a, (P_b^2 - P_c^2)\}$	C4	$\rho_{bc}(c_4)$	$-0.7047(94) \times 10^{-4}$	μ^{-1}
$\{404\}$	$-P^4$	DJ	Δ_J	$1.688465(31) \times 10^{-6}$	μ^{-2}
	$-P^2 P_a^2$	DJK	Δ_{JK}	$9.20(25) \times 10^{-5}$	μ^{-2}
	$-P_a^4$	DK	Δ_K	$8.524(10) \times 10^{-3}$	μ^{-2}
	$-2P^2(P_b^2 - P_c^2)$	ODELN	δ_J	$5.9414(33) \times 10^{-8}$	μ^{-2}
	$-\{P_a^2, (P_b^2 - P_c^2)\}$	ODELK	δ_K	$5.7361(89) \times 10^{-5}$	μ^{-2}
	$\{P_a, P_b\}P^2$	DABJ	D_{abJ}	$-0.548(23) \times 10^{-7}$	μ^{-2}
	$\{P_a^3, P_b\}$	DABK	D_{abK}	$1.443(11) \times 10^{-3}$	μ^{-2}
$\{660\}$	P_γ^6	AK4B	$F_{mm}(k_{4B})$	$1.01639(75) \times 10^{-5}$	μ^{-3}
	$(1 - \cos 9\gamma)/2$	V9	V_9	$-0.05126(34)$	μ^0
$\{651\}$	$P_\gamma^5 P_a$	AK3B	$\rho_{mm}(k_{3B})$	$6.7042(35) \times 10^{-5}$	μ^{-2}
$\{642\}$	$P_\gamma^4 P^2$	AMV	$F_{mJ}(M_v)$	$9.215(14) \times 10^{-8}$	μ^{-3}
	$P_\gamma^4 P_a^2$	BK1	$F_{mK}(K_1)$	$1.79670(69) \times 10^{-4}$	μ^{-3}
	$P_\gamma^4\{P_a, P_b\}$	DELTAB	$F_{mab}(\Delta\Delta_{ab})$	$0.773(54) \times 10^{-6}$	μ^{-3}
	$2P_\gamma^4(P_b^2 - P_c^2)$	C3	$F_{mbc}(c_3)$	$0.214(18) \times 10^{-7}$	μ^{-3}
	$\{(1 - \cos 3\gamma), P_\gamma^2\}P^2$	AK7J	$V_{3mJ}(k_{7J})$	$9.4(16) \times 10^{-6}$	μ^{-2}
	$(1 - \cos 6\gamma)P^2$	ANV	$V_{6J}(N_v)$	$2.64(53) \times 10^{-5}$	μ^{-1}
	$(1 - \cos 6\gamma)P_a^2$	BK2	$V_{6K}(K_2)$	$-1.3905(25) \times 10^{-4}$	μ^{-1}
	$(1 - \cos 6\gamma)\{P_a, P_b\}$	ODAB6	$V_{6ab}(dd_{ab})$	$-0.388(16) \times 10^{-4}$	μ^{-1}
	$(1 - \cos 6\gamma)(P_b^2 - P_c^2)$	C11	$V_{6bc}(c_{11})$	$-3.3840(70) \times 10^{-5}$	μ^{-1}
	$\sin 6\gamma\{P_a, P_c\}$	DAC6	D_{6ac}	$3.401(58) \times 10^{-4}$	μ^{-1}
$\{633\}$	$P_\gamma^3 P_a P^2$	AK3J	$\rho_{mJ}(k_{3J})$	$7.875(69) \times 10^{-7}$	μ^{-2}
	$P_\gamma^3 P_a^3$	AK3K	$\rho_{mK}(k_{3K})$	$2.51512(70) \times 10^{-4}$	μ^{-2}
	$P_\gamma^3\{P_a^2, P_b\}$	ODELTB	$\rho_{mab}(\delta\delta_{ab})$	$1.61(11) \times 10^{-6}$	μ^{-2}
	$P_\gamma^3\{P_a, (P_b^2 - P_c^2)\}$	C12	$\rho_{mbc}(c_{12})$	$6.903(52) \times 10^{-7}$	μ^{-2}
	$\{(1 - \cos 3\gamma), P_a P^2 P_\gamma\}$	AK6J	$\rho_{3J}(k_{6J})$	$2.11(27) \times 10^{-5}$	μ^{-1}
	$\{(1 - \cos 3\gamma), P_a^3 P_\gamma\}$	AK6K	$\rho_{3K}(k_{6K})$	$0.385(63) \times 10^{-4}$	μ^{-1}
$\{624\}$	$P_\gamma^2 P^4$	GVJ	$F_{JJ}(g_v)$	$0.5243(22) \times 10^{-9}$	μ^{-3}
	$P_\gamma^2 P_a^2 P^2$	AK2J	$F_{JK}(k_{2J})$	$1.769(19) \times 10^{-6}$	μ^{-3}
	$P_\gamma^2\{P_a, P_b\}P^2$	DELTAJ	F_{Jab}	$2.75(21) \times 10^{-9}$	μ^{-3}
	$2P_\gamma^2 P^2(P_b^2 - P_c^2)$	C1J	$F_{Jbc}(c_5)$		μ^{-3}
	$P_\gamma^2 P_a^4$	AK2K	$F_{KK}(k_{2K})$	$1.94907(47) \times 10^{-4}$	μ^{-3}
	$P_\gamma^2\{P_a^3, P_b\}$	DELTAK	F_{Kab}	$8.29(59) \times 10^{-7}$	μ^{-3}
	$P_\gamma^2\{P_a^2, (P_b^2 - P_c^2)\}$	C1K	$F_{Kbc}(c_8)$	$1.518(15) \times 10^{-6}$	μ^{-3}
	$(1 - \cos 3\gamma)P^4$	OFV	$V_{3JJ}(f_v)$	$9.149(21) \times 10^{-9}$	μ^{-2}
	$(1 - \cos 3\gamma)P_a^2 P^2$	AK5J	$V_{3JK}(k_{5J})$	$7.6(26) \times 10^{-6}$	μ^{-2}
	$(1 - \cos 3\gamma)\{P_a, P_b\}P^2$	ODABJ	$V_{3Jab}(d_{abJ})$	$-2.027(17) \times 10^{-7}$	μ^{-2}
	$2(1 - \cos 3\gamma)(P_b^2 - P_c^2)P^2$	C2J	$V_{3Jbc}(c_{2J})$	$1.251(43) \times 10^{-9}$	μ^{-2}
	$(1 - \cos 3\gamma)P_a^4$	AK5K	$V_{3KK}(f_k)$	$0.78(10) \times 10^{-4}$	μ^{-2}
	$(1 - \cos 3\gamma)\{P_a^3, P_b\}$	ODABK	$V_{3Kab}(d_{abK})$	$-1.538(79) \times 10^{-7}$	μ^{-2}
	$(1 - \cos 3\gamma)\{P_a^2, (P_b^2 - P_c^2)\}$	C2K	$V_{3Kbc}(c_9)$	$7.232(86) \times 10^{-6}$	μ^{-2}
	$\sin 3\gamma P^2\{P_a, P_c\}$	DACJ	D_{3acJ}	$-2.888(23) \times 10^{-7}$	μ^{-2}
	$\sin 3\gamma P^2\{P_b, P_c\}$	DBCJ	D_{3bcJ}	$-1.070(58) \times 10^{-8}$	μ^{-2}
	$\sin 3\gamma\{P_a^3, P_c\}$	DACK	D_{3acK}	$0.70(10) \times 10^{-6}$	μ^{-2}
	$\sin 3\gamma\{P_a^2, \{P_b, P_c\}\}$	DBCK	D_{3bcK}	$-0.585(70) \times 10^{-6}$	μ^{-2}
$\{615\}$	$P_\gamma P_a P^4$	OLV	$\rho_{JJ}(l_v)$	$0.8961(62) \times 10^{-9}$	μ^{-2}
	$P_\gamma P_a^3 P^2$	AK1J	$\rho_{JK}(\lambda_v)$	$1.231(14) \times 10^{-6}$	μ^{-2}
	$P_\gamma P^2\{P_a^2, P_b\}$	DAGJ	ρ_{Jab}	$1.91(18) \times 10^{-9}$	μ^{-2}
	$P_\gamma P^2\{P_a, (P_b^2 - P_c^2)\}$	C4J	$\rho_{Jbc}(c_7)$	$0.426(33) \times 10^{-9}$	μ^{-2}
	$P_\gamma P_a^5$	AK1K	$\rho_{KK}(l_k)$	$7.9805(24) \times 10^{-5}$	μ^{-2}
	$P_\gamma\{P_a^3, (P_b^2 - P_c^2)\}$	C4K	$\rho_{Kbc}(c_{7K})$	$1.119(16) \times 10^{-6}$	μ^{-2}
$\{606\}$	P^6	HJ	H_J	$-1.191(16) \times 10^{-12}$	μ^{-3}
	$P^4 P_a^2$	HJK	H_{JK}	$4.781(40) \times 10^{-10}$	μ^{-3}
	$P_a^4 P^2$	HKJ	H_{KJ}	$2.336(37) \times 10^{-7}$	μ^{-3}
	P_a^6	HK	H_K	$1.35675(51) \times 10^{-5}$	μ^{-3}
	$P^2\{P_a^2, (P_b^2 - P_c^2)\}$	OHJK	h_{JK}	$0.427(31) \times 10^{-9}$	μ^{-3}
	$\{P_a^4, (P_b^2 - P_c^2)\}$	OHK	h_K	$2.928(54) \times 10^{-7}$	μ^{-3}
$\{880\}$	P_γ^8	AK4C	$F_{mmm}(k_{4BB})$	$-0.5887(30) \times 10^{-7}$	μ^{-4}
$\{871\}$	$P_\gamma^7 P_a$	AK3C	$\rho_{mmm}(k_{3BB})$	$-0.3447(19) \times 10^{-6}$	μ^{-3}

(continued on next page)

Term order $\{nlm\}$	Operator	Parameter		$^{12}CH_3^{16}OH$	μ dependence
		In BELGI	Literature		
$\{862\}$	$P_\gamma^6 P^2$	AK4BJ	F_{mmJ}	$-0.4129(60) \times 10^{-9}$	μ^{-4}
	$P_\gamma^6 P_a^2$	AK4BK	F_{mmK}	$-0.8527(55) \times 10^{-6}$	μ^{-4}
	$(1-\cos 9\gamma)P^2$	V9J	V_{9J}	$-1.31(66) \times 10^{-6}$	μ^{-1}
	$(1-\cos 9\gamma)\{P_a, P_b\}$	ODAB9	V_{9ab}	$-0.819(43) \times 10^{-4}$	μ^{-1}
$\{853\}$	$P_\gamma^5 P_a P^2$	AK3BJ	ρ_{mmJ}	$-1.635(26) \times 10^{-9}$	μ^{-3}
	$P_\gamma^5 P_a^3$	AK3BK	ρ_{mmK}	$-1.1548(88) \times 10^{-6}$	μ^{-3}
$\{844\}$	$P_\gamma^4 P_a^2 P^2$	G4J2K2	$F_{mJK}(K_{1J})$	$-2.097(63) \times 10^{-9}$	μ^{-4}
	$P_\gamma^4 P^2 \{P_a, P_b\}$	DG4J	F_{mJab}	$-8.67(73) \times 10^{-12}$	μ^{-4}
	$P_\gamma^4 P_a^4$	G4K4	$F_{mKK}(K_{1K})$	$-0.9220(84) \times 10^{-6}$	μ^{-4}
	$P_\gamma^4 \{P_a^2, (P_b^2 - P_c^2)\}$	G4BCK	F_{mKbc}	$0.886(95) \times 10^{-10}$	μ^{-4}
	$(1-\cos 6\gamma)P^4$	C6J4	$V_{6JJ}(N_{vJ})$	$4.44(32) \times 10^{-10}$	μ^{-2}
	$(1-\cos 6\gamma)P^2 P_a^2$	C6J2K2	V_{6JK}	$1.953(61) \times 10^{-7}$	μ^{-2}
	$(1-\cos 6\gamma)P^2\{P_a, P_b\}$	CABJ	V_{6Jab}	$3.50(15) \times 10^{-8}$	μ^{-2}
	$2(1-\cos 6\gamma)P^2(P_b^2 - P_c^2)$	C6BCJ	V_{6Jbc}	$1.326(52) \times 10^{-9}$	μ^{-2}
	$(1-\cos 6\gamma)P_a^4$	C6K4	V_{6KK}	$-3.143(66) \times 10^{-7}$	μ^{-2}
	$(1-\cos 6\gamma)\{P_a^3, P_b\}$	CABK	$V_{6Kab}(dd_{abK})$	$2.26(21) \times 10^{-7}$	μ^{-2}
	$(1-\cos 6\gamma)\{P_a^2, (P_b^2 - P_c^2)\}$	C6BCK	$V_{6Kbc}(c_{11K})$	$-1.351(43) \times 10^{-7}$	μ^{-2}
$\{835\}$	$P_\gamma^3 P_a^3 P^2$	GAJ2K2	ρ_{mJK}	$-1.062(64) \times 10^{-9}$	μ^{-3}
	$P_\gamma^3 P_a^5$	GAK4	ρ_{mKK}	$-4.305(48) \times 10^{-7}$	μ^{-3}
	$P_\gamma^3 \{P_a^3, (P_b^2 - P_c^2)\}$	AG3BCK	ρ_{mKbc}	$8.66(94) \times 10^{-11}$	μ^{-3}
	$\{(1-\cos 3\gamma), P_a^3 P_\gamma\}P^2$	AK6JK	ρ_{3JK}	$5.58(22) \times 10^{-8}$	μ^{-2}
$\{826\}$	$P_\gamma^2 P_a^2 P^4$	GJ4K2	F_{JJK}	$1.477(32) \times 10^{-12}$	μ^{-4}
	$P_\gamma^2 P_a^4 P^2$	GJ2K4	F_{JKK}	$-1.90(20) \times 10^{-10}$	μ^{-4}
	$P_\gamma^2 P^2 \{P_a^3, P_b\}$	DELTJK	F_{JKab}	$4.53(59) \times 10^{-12}$	μ^{-4}
	$P_\gamma^2 P_a^6$	GK6	F_{KKK}	$-1.068(15) \times 10^{-7}$	μ^{-4}
	$P_\gamma^2 \{P_a^5, P_b\}$	DELTKK	F_{KKab}	$-0.89(11) \times 10^{-11}$	μ^{-4}
	$(1-\cos 3\gamma)P^2 P_a^4$	FJ2K4	V_{3JKK}	$0.914(36) \times 10^{-7}$	μ^{-3}
	$(1-\cos 3\gamma)P_a^6$	FK6	V_{3KKK}	$-1.00(46) \times 10^{-10}$	μ^{-3}
	$\sin 3\gamma P^4\{P_a, P_c\}$	DACJJ	D_{3acJJ}	$-0.717(46) \times 10^{-11}$	μ^{-3}
	$\sin 3\gamma P^2\{P_a^3, P_c\}$	DACJK	D_{3acJK}	$-1.593(30) \times 10^{-9}$	μ^{-3}
$\{817\}$	$P_\gamma P_a^3 P^4$	AGJ4K2	ρ_{JJK}	$1.192(20) \times 10^{-12}$	μ^{-3}
	$P_\gamma P_a^7$	AGK6	$\rho_{KKK}(l_{KK})$	$-1.033(21) \times 10^{-8}$	μ^{-3}
$\{10\,10\,0\}$	P_γ^{10}	AK4D	F_{mmmm}	$-0.940(20) \times 10^{-10}$	μ^{-5}
$\{10\,9\,1\}$	$P_\gamma^9 P_a$	AK3D	ρ_{mmmm}	$-4.663(92) \times 10^{-10}$	μ^{-4}
$\{10\,8\,2\}$	$P_\gamma^8 P_a^2$	AK4CK	F_{mmmK}	$-0.939(17) \times 10^{-9}$	μ^{-5}
$\{10\,7\,3\}$	$P_\gamma^7 P_a^3$	AK3CK	ρ_{mmmK}	$-0.957(17) \times 10^{-9}$	μ^{-4}
$\{10\,6\,4\}$	$P_\gamma^6 P_a^4$	AK4BK4	F_{mmKK}	$-4.915(82) \times 10^{-10}$	μ^{-5}
$\{10\,5\,5\}$	$P_\gamma^5 P_a^5$	AK3BK4	ρ_{mmKK}	$-1.017(16) \times 10^{-10}$	μ^{-4}

Table III. Molecular constants used to simulate the torsional groundstate of $^{12}CH_3^{16}OH$, taken from ref. [**?**]. The last column shows the dependence of these constants to the proton-to-electron mass ratio, μ. The rotational, centrifugal and torsional constants A, B, C, D_{ab}, F and ρ are explicit functions of I_a, I_b, and I_c and are given in ref. [2]. The dependence of these constants on μ can be obtained by realizing that all moments of inertia are directly proportional to μ. Within the Born-Oppenheimer approximation the torsional potential, V_3, is independent of the mass of the nuclei and hence of μ. The higher order constants can be considered as products of the first 7 constants.

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