

**The microwave spectrum and molecular structure of vinyl chloride-HCCH, a side-binding complex**

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***Supporting Information***

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Table 1S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Broadband, Chirped-pulse Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
4	1	3	2.5	4	0	4	2.5	6139.2403	0.0093
4	1	3	5.5	4	0	4	5.5	6144.2323	-0.0011
4	1	3	3.5	4	0	4	3.5	6153.4918	-0.0027
4	1	3	4.5	4	0	4	4.5	6158.5252	-0.0039
1	1	1	1.5	0	0	0	1.5	6866.3042	0.0023
1	1	1	2.5	0	0	0	1.5	6883.0774	0.0003
1	1	1	0.5	0	0	0	1.5	6896.5194	0.0005
5	1	4	3.5	5	0	5	3.5	7204.7936	0.0079
5	1	4	6.5	5	0	5	6.5	7209.3084	-0.0015
5	1	4	4.5	5	0	5	4.5	7220.8846	0.0048
5	1	4	5.5	5	0	5	5.5	7225.4423	-0.0168
4	0	4	2.5	3	1	3	1.5	7277.3435	-0.0012
4	0	4	5.5	3	1	3	4.5	7281.8336	0.0028
4	0	4	3.5	3	1	3	2.5	7288.1034	0.0009
4	0	4	4.5	3	1	3	3.5	7292.5364	0.0009
6	1	5	4.5	6	0	6	4.5	8587.1855	-0.0088
6	1	5	7.5	6	0	6	7.5	8591.3344	0.0040
6	1	5	5.5	6	0	6	5.5	8604.8299	-0.0029
6	1	5	6.5	6	0	6	6.5	8609.0634	0.0023
2	1	2	2.5	1	0	1	1.5	9267.1764	-0.0003
2	1	2	1.5	1	0	1	1.5	9272.8032	0.0020
2	1	2	2.5	1	0	1	2.5	9276.1121	-0.0039
2	1	2	0.5	1	0	1	1.5	9280.6648	0.0054
2	1	2	3.5	1	0	1	2.5	9283.9379	0.0014
2	1	2	1.5	1	0	1	0.5	9288.8843	-0.0023
2	1	2	0.5	1	0	1	0.5	9296.7403	-0.0045
7	1	6	5.5	6	2	5	4.5	10172.4173	0.0067
7	1	6	8.5	6	2	5	7.5	10174.1314	-0.0072
7	1	6	6.5	6	2	5	5.5	10183.7042	0.0005
7	1	6	7.5	6	2	5	6.5	10186.6531	0.0105
7	1	6	5.5	7	0	7	5.5	10304.7711	-0.0061
7	1	6	8.5	7	0	7	8.5	10307.9138	0.0043
5	0	5	3.5	4	1	4	2.5	10336.4216	0.0058
5	0	5	6.5	4	1	4	5.5	10339.1351	0.0002
5	0	5	4.5	4	1	4	3.5	10344.6303	-0.0009
5	0	5	5.5	4	1	4	4.5	10347.2931	0.0000
7	2	5	7.5	7	1	6	7.5	10789.6489	-0.0050
7	2	5	6.5	7	1	6	6.5	10789.9651	0.0021
7	2	5	8.5	7	1	6	8.5	10791.1537	-0.0018
7	2	5	5.5	7	1	6	5.5	10791.4574	0.0010
6	2	4	6.5	6	1	5	6.5	10914.8783	-0.0041
6	2	4	5.5	6	1	5	5.5	10915.9761	0.0000

Table 1S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Broadband, Chirped-pulse Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
6	2	4	7.5	6	1	5	7.5	10919.4919	0.0072
6	2	4	4.5	6	1	5	4.5	10920.5669	-0.0067
5	2	3	5.5	5	1	4	5.5	11221.9241	-0.0013
5	2	3	4.5	5	1	4	4.5	11224.1712	-0.0001
5	2	3	6.5	5	1	4	6.5	11229.8737	0.0024
5	2	3	3.5	5	1	4	3.5	11232.1267	0.0129
3	1	3	3.5	2	0	2	2.5	11516.0126	-0.0012
3	1	3	2.5	2	0	2	2.5	11518.7736	0.0034
3	1	3	3.5	2	0	2	3.5	11524.0227	0.0057
3	1	3	2.5	2	0	2	1.5	11524.4604	-0.0053
3	1	3	4.5	2	0	2	3.5	11529.8889	-0.0048
3	1	3	1.5	2	0	2	1.5	11530.3806	0.0062
3	1	3	1.5	2	0	2	0.5	11538.3826	-0.0061
4	2	2	4.5	4	1	3	4.5	11635.2471	0.0006
4	2	2	3.5	4	1	3	3.5	11639.3310	-0.0040
4	2	2	5.5	4	1	3	5.5	11646.8995	-0.0008
4	2	2	2.5	4	1	3	2.5	11651.0047	0.0004
3	2	1	3.5	3	1	2	3.5	12075.9008	-0.0018
3	2	1	2.5	3	1	2	2.5	12083.5614	-0.0004
3	2	1	4.5	3	1	2	4.5	12092.2962	0.0071
2	2	0	2.5	2	1	1	2.5	12469.8352	0.0080
2	2	0	2.5	2	1	1	1.5	12481.8018	-0.0345
2	2	0	3.5	2	1	1	3.5	12494.6180	0.0102
6	0	6	4.5	5	1	5	3.5	13361.2881	0.0000
6	0	6	7.5	5	1	5	6.5	13363.0281	0.0001
6	0	6	5.5	5	1	5	4.5	13367.3991	-0.0016
6	0	6	6.5	5	1	5	5.5	13369.0422	-0.0064
2	2	1	2.5	2	1	2	3.5	13429.2815	-0.0096
2	2	1	1.5	2	1	2	0.5	13430.0039	-0.0115
2	2	1	2.5	2	1	2	2.5	13437.1136	0.0020
2	2	1	1.5	2	1	2	1.5	13437.8843	0.0106
2	2	1	3.5	2	1	2	3.5	13438.2222	0.0013
2	2	1	0.5	2	1	2	0.5	13438.9448	-0.0132
2	2	1	1.5	2	1	2	2.5	13443.4926	-0.0055
2	2	1	3.5	2	1	2	2.5	13446.0558	0.0144
4	1	4	4.5	3	0	3	3.5	13632.5276	0.0016
4	1	4	3.5	3	0	3	2.5	13637.4973	-0.0026
4	1	4	5.5	3	0	3	4.5	13644.5355	0.0026
3	2	2	1.5	3	1	3	1.5	13928.2679	0.0230
3	2	2	4.5	3	1	3	4.5	13931.0150	-0.0006
3	2	2	2.5	3	1	3	2.5	13934.1537	0.0060
3	2	2	3.5	3	1	3	3.5	13936.8962	-0.0041

Table 1S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Broadband, Chirped-pulse Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	2	3	2.5	4	1	4	2.5	14592.2840	-0.0026
4	2	3	5.5	4	1	4	5.5	14595.3850	0.0010
4	2	3	3.5	4	1	4	3.5	14601.0770	0.0050
4	2	3	4.5	4	1	4	4.5	14604.1348	0.0025
5	1	5	5.5	4	0	4	4.5	15654.2396	-0.0009
5	1	5	4.5	4	0	4	3.5	15657.4519	-0.0067
5	1	5	6.5	4	0	4	5.5	15664.5137	0.0014
5	1	5	3.5	4	0	4	2.5	15667.7633	-0.0043
7	0	7	5.5	6	1	6	4.5	16312.4005	0.0091
7	0	7	8.5	6	1	6	7.5	16314.1511	0.0019
7	0	7	6.5	6	1	6	5.5	16317.3171	-0.0014
7	0	7	7.5	6	1	6	6.5	16317.8548	-0.0213
6	1	6	6.5	5	0	5	5.5	17627.2272	-0.0037
6	1	6	5.5	5	0	5	4.5	17629.3738	0.0088
6	1	6	7.5	5	0	5	6.5	17635.7588	0.0136
6	1	6	4.5	5	0	5	3.5	17637.8921	-0.0068
7	2	6	6.5	7	1	7	6.5	17645.1323	-0.0126
7	2	6	7.5	7	1	7	7.5	17647.5959	0.0132

Table 2S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Broadband, Chirped-pulse Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
1	1	1	1.5	0	0	0	1.5	6738.2789	-0.0018
1	1	1	2.5	0	0	0	1.5	6751.4621	-0.0011
1	1	1	0.5	0	0	0	1.5	6762.0167	-0.0069
5	1	4	3.5	5	0	5	3.5	7125.0926	0.0046
5	1	4	6.5	5	0	5	6.5	7128.6719	-0.0037
5	1	4	4.5	5	0	5	4.5	7137.8320	-0.0120
5	1	4	5.5	5	0	5	5.5	7141.4426	-0.0252
4	0	4	2.5	3	1	3	1.5	7293.7790	0.0076
4	0	4	5.5	3	1	3	4.5	7297.2633	-0.0001
4	0	4	3.5	3	1	3	2.5	7302.1430	0.0089
4	0	4	4.5	3	1	3	3.5	7305.5946	0.0013
6	1	5	4.5	6	0	6	4.5	8522.8894	0.0181
6	1	5	7.5	6	0	6	7.5	8526.1748	0.0238
6	1	5	5.5	6	0	6	5.5	8536.8694	0.0252
6	1	5	6.5	6	0	6	6.5	8540.1802	-0.0081
2	1	2	2.5	1	0	1	1.5	9115.3121	0.0014
2	1	2	1.5	1	0	1	1.5	9119.7435	0.0039
2	1	2	2.5	1	0	1	2.5	9122.3102	-0.0069
2	1	2	3.5	1	0	1	2.5	9128.4875	0.0038
2	1	2	1.5	1	0	1	0.5	9132.3439	-0.0045
2	1	2	0.5	1	0	1	0.5	9138.5516	0.0133
7	1	6	8.5	7	0	7	8.5	10260.1065	0.0004
7	1	6	6.5	7	0	7	6.5	10271.9200	-0.0173
7	1	6	7.5	7	0	7	7.5	10274.4872	-0.0040
5	0	5	6.5	4	1	4	5.5	10325.1653	-0.0003
5	0	5	4.5	4	1	4	3.5	10329.3906	-0.0113
5	0	5	5.5	4	1	4	4.5	10331.4613	-0.0056
6	2	4	6.5	6	1	5	6.5	10620.3599	0.0062
6	2	4	5.5	6	1	5	5.5	10621.1556	-0.0106
6	2	4	7.5	6	1	5	7.5	10623.7735	0.0018
6	2	4	4.5	6	1	5	4.5	10624.5798	-0.0006
4	2	2	4.5	4	1	3	4.5	11316.2885	-0.0019
4	2	2	5.5	4	1	3	5.5	11325.3306	-0.0033
3	1	3	3.5	2	0	2	2.5	11339.3342	0.0054
3	1	3	2.5	2	0	2	2.5	11341.4847	-0.0224
3	1	3	2.5	2	0	2	1.5	11345.9551	-0.0010
3	1	3	4.5	2	0	2	3.5	11350.2268	0.0010
3	1	3	1.5	2	0	2	0.5	11356.8891	0.0101
3	2	1	3.5	3	1	2	3.5	11753.7241	0.0033
3	2	1	2.5	3	1	2	2.5	11759.7096	-0.0006
3	2	1	4.5	3	1	2	4.5	11766.5508	0.0197
3	2	1	1.5	3	1	2	1.5	11772.5088	-0.0018

Table 2S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Broadband, Chirped-pulse Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	1	2.5	2	1	2	2.5	13115.7547	-0.0007
2	2	1	3.5	2	1	2	3.5	13116.5964	0.0070
6	0	6	4.5	5	1	5	3.5	13314.1732	-0.0069
6	0	6	7.5	5	1	5	6.5	13315.5084	-0.0039
6	0	6	5.5	5	1	5	4.5	13318.8456	-0.0014
6	0	6	6.5	5	1	5	5.5	13320.1273	0.0106
4	1	4	4.5	3	0	3	3.5	13431.6706	-0.0011
4	1	4	3.5	3	0	3	2.5	13435.5669	0.0061
4	1	4	5.5	3	0	3	4.5	13441.0805	0.0063
4	1	4	2.5	3	0	3	1.5	13444.9885	0.0044
3	2	2	1.5	3	1	3	1.5	13610.2053	-0.0087
3	2	2	4.5	3	1	3	4.5	13612.3974	-0.0038
3	2	2	2.5	3	1	3	2.5	13614.8815	0.0021
3	2	2	3.5	3	1	3	3.5	13617.0491	-0.0055
4	2	3	2.5	4	1	4	2.5	14278.0958	-0.0185
4	2	3	5.5	4	1	4	5.5	14280.5530	-0.0014
4	2	3	3.5	4	1	4	3.5	14285.0623	0.0201
4	2	3	4.5	4	1	4	4.5	14287.4512	-0.0059
5	2	4	3.5	5	1	5	3.5	15121.2608	0.0049
5	2	4	6.5	5	1	5	6.5	15123.6469	0.0102
5	2	4	4.5	5	1	5	4.5	15129.4784	-0.0058
5	2	4	5.5	5	1	5	5.5	15131.6251	-0.0056
5	1	5	5.5	4	0	4	4.5	15430.8370	-0.0347
5	1	5	4.5	4	0	4	3.5	15433.3779	0.0000
5	1	5	6.5	4	0	4	5.5	15438.8915	0.0091
5	1	5	3.5	4	0	4	2.5	15441.4122	0.0014
7	0	7	8.5	6	1	6	7.5	16229.5485	-0.0105
7	0	7	5.5	6	1	6	4.5	16232.0066	-0.0048
7	0	7	6.5	6	1	6	5.5	16232.0066	-0.0048
7	0	7	7.5	6	1	6	6.5	16233.3871	0.0169
6	1	6	6.5	5	0	5	5.5	17384.1180	0.0202
6	1	6	5.5	5	0	5	4.5	17385.8129	0.0062
6	1	6	7.5	5	0	5	6.5	17390.7563	-0.0075
6	1	6	4.5	5	0	5	3.5	17392.3191	-0.0050
2	2	1	2.5	1	1	0	1.5	17859.5009	-0.0050
2	2	1	1.5	1	1	0	1.5	17864.4992	-0.0125
2	2	1	2.5	1	1	0	2.5	17865.6832	0.0040
2	2	1	3.5	1	1	0	2.5	17872.6835	0.0036
2	2	1	1.5	1	1	0	0.5	17875.6591	0.0118
2	2	1	0.5	1	1	0	0.5	17882.6532	-0.0026

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	0	2.5	3	1	3	3.5	5780.3937	-0.0007
2	2	0	3.5	3	1	3	4.5	5782.5054	0.0034
2	2	0	1.5	3	1	3	2.5	5783.3464	-0.0018
2	2	0	0.5	3	1	3	1.5	5785.4503	-0.0018
4	1	3	2.5	4	0	4	3.5	6134.3837	-0.0005
4	1	3	2.5	4	0	4	2.5	6139.2318	0.0011
4	1	3	5.5	4	0	4	4.5	6139.4081	0.0004
4	1	3	5.5	4	0	4	5.5	6144.2336	0.0001
4	1	3	3.5	4	0	4	4.5	6151.8159	-0.0010
4	1	3	3.5	4	0	4	3.5	6153.4928	0.0001
4	1	3	3.5	4	0	4	2.5	6158.3410	0.0018
4	1	3	4.5	4	0	4	4.5	6158.5261	0.0001
4	1	3	4.5	4	0	4	3.5	6160.2036	0.0017
4	1	3	4.5	4	0	4	5.5	6163.3514	-0.0004
6	1	5	4.5	5	2	4	3.5	6517.7209	0.0004
6	1	5	7.5	5	2	4	6.5	6520.6467	-0.0022
6	1	5	5.5	5	2	4	4.5	6531.1510	0.0027
6	1	5	6.5	5	2	4	5.5	6534.1909	0.0019
1	1	1	1.5	0	0	0	1.5	6866.3031	-0.0019
1	1	1	2.5	0	0	0	1.5	6883.0787	0.0026
1	1	1	0.5	0	0	0	1.5	6896.5136	-0.0016
5	1	4	3.5	5	0	5	4.5	7201.9904	-0.0015
5	1	4	3.5	5	0	5	3.5	7204.7881	0.0011
5	1	4	6.5	5	0	5	5.5	7206.5503	0.0011
5	1	4	6.5	5	0	5	6.5	7209.3103	0.0001
5	1	4	4.5	5	0	5	5.5	7220.1160	-0.0007
5	1	4	4.5	5	0	5	4.5	7220.8785	0.0004
5	1	4	4.5	5	0	5	3.5	7223.6744	0.0012
5	1	4	5.5	5	0	5	5.5	7225.4571	0.0004
5	1	4	5.5	5	0	5	4.5	7226.2193	0.0013
5	1	4	5.5	5	0	5	6.5	7228.2179	0.0001
4	0	4	2.5	3	1	3	1.5	7277.3486	-0.0006
4	0	4	5.5	3	1	3	4.5	7281.8327	-0.0016
4	0	4	2.5	3	1	3	2.5	7283.2559	-0.0020
4	0	4	4.5	3	1	3	4.5	7286.6580	-0.0020
4	0	4	3.5	3	1	3	2.5	7288.1047	0.0003
4	0	4	3.5	3	1	3	3.5	7290.8603	-0.0007
4	0	4	4.5	3	1	3	3.5	7292.5377	0.0009
4	3	2	4.5	5	2	3	5.5	7453.1232	-0.0017
4	3	2	3.5	5	2	3	4.5	7457.0660	-0.0030
4	3	2	5.5	5	2	3	6.5	7466.5207	0.0033
4	3	2	2.5	5	2	3	3.5	7470.4626	-0.0032

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
3	1	3	3.5	2	1	2	3.5	7667.6432	-0.0004
3	1	3	1.5	2	1	2	0.5	7670.6459	-0.0011
3	1	3	2.5	2	1	2	1.5	7672.5955	-0.0003
3	1	3	4.5	2	1	2	3.5	7673.5217	0.0013
3	1	3	3.5	2	1	2	2.5	7675.4627	-0.0008
3	1	3	2.5	2	1	2	2.5	7678.2181	-0.0019
3	1	3	1.5	2	1	2	1.5	7678.5019	-0.0026
4	3	1	4.5	5	2	4	5.5	8073.8425	-0.0013
4	3	1	3.5	5	2	4	4.5	8075.9446	-0.0035
4	3	1	5.5	5	2	4	6.5	8080.9347	0.0027
4	3	1	2.5	5	2	4	3.5	8083.1525	-0.0017
3	0	3	1.5	2	0	2	1.5	8091.7375	-0.0022
3	0	3	2.5	2	0	2	2.5	8092.6654	-0.0015
3	0	3	3.5	2	0	2	2.5	8095.7399	0.0004
3	0	3	4.5	2	0	2	3.5	8097.1319	0.0006
3	0	3	2.5	2	0	2	1.5	8098.3599	0.0001
3	0	3	1.5	2	0	2	0.5	8099.7508	0.0000
3	0	3	3.5	2	0	2	3.5	8103.7403	-0.0001
3	2	2	1.5	2	2	1	0.5	8159.9374	0.0005
3	2	2	4.5	2	2	1	3.5	8166.3148	-0.0015
3	2	2	2.5	2	2	1	1.5	8168.8710	0.0005
3	2	2	3.5	2	2	1	2.5	8175.2502	-0.0006
3	2	1	1.5	2	2	0	0.5	8230.9259	0.0016
3	2	1	4.5	2	2	0	3.5	8237.7237	-0.0010
3	2	1	2.5	2	2	0	1.5	8241.2470	-0.0003
3	2	1	3.5	2	2	0	2.5	8248.0425	-0.0008
6	1	5	4.5	6	0	6	4.5	8587.1969	0.0010
6	1	5	7.5	6	0	6	7.5	8591.3301	-0.0011
6	1	5	5.5	6	0	6	5.5	8604.8322	0.0010
6	1	5	6.5	6	0	6	6.5	8609.0582	-0.0007
3	1	2	1.5	2	1	1	1.5	8626.5411	-0.0012
3	1	2	2.5	2	1	1	2.5	8633.2264	0.0009
3	1	2	4.5	2	1	1	3.5	8640.0415	-0.0005
3	1	2	3.5	2	1	1	2.5	8641.9702	0.0005
3	1	2	1.5	2	1	1	0.5	8643.2936	0.0018
3	1	2	2.5	2	1	1	1.5	8645.2331	0.0010
2	1	2	2.5	1	0	1	1.5	9267.1794	-0.0009
2	1	2	1.5	1	0	1	1.5	9272.8021	-0.0024
2	1	2	2.5	1	0	1	2.5	9276.1161	-0.0001
2	1	2	0.5	1	0	1	1.5	9280.6591	-0.0028
2	1	2	1.5	1	0	1	2.5	9281.7390	-0.0014
2	1	2	3.5	1	0	1	2.5	9283.9382	0.0022



Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
2	1	2	1.5	1	0	1	0.5	9288.8843	0.0001
2	1	2	0.5	1	0	1	0.5	9296.7415	-0.0001
7	1	6	5.5	6	2	5	4.5	10172.4122	-0.0007
7	1	6	8.5	6	2	5	7.5	10174.1382	-0.0025
7	1	6	6.5	6	2	5	5.5	10183.7057	0.0019
7	1	6	7.5	6	2	5	6.5	10186.6443	0.0024
4	1	4	4.5	3	1	3	4.5	10206.3752	-0.0010
4	1	4	2.5	3	1	3	1.5	10210.9064	0.0001
4	1	4	3.5	3	1	3	2.5	10211.3975	0.0010
4	1	4	5.5	3	1	3	4.5	10211.7723	0.0005
4	1	4	4.5	3	1	3	3.5	10212.2535	0.0006
4	1	4	3.5	3	1	3	3.5	10214.1553	0.0022
7	1	6	5.5	7	0	7	5.5	10304.7799	0.0003
7	1	6	8.5	7	0	7	8.5	10307.9095	-0.0019
7	1	6	6.5	7	0	7	6.5	10322.9634	-0.0007
7	1	6	7.5	7	0	7	7.5	10327.3216	0.0001
5	0	5	3.5	4	1	4	2.5	10336.4198	-0.0011
5	0	5	6.5	4	1	4	5.5	10339.1385	-0.0008
5	0	5	3.5	4	1	4	3.5	10341.8383	-0.0011
5	0	5	5.5	4	1	4	5.5	10341.8980	-0.0023
5	0	5	4.5	4	1	4	3.5	10344.6348	0.0004
5	0	5	4.5	4	1	4	4.5	10346.5331	-0.0015
5	0	5	5.5	4	1	4	4.5	10347.2967	0.0007
3	3	1	3.5	4	2	2	4.5	10442.5620	0.0015
3	3	1	3.5	4	2	2	3.5	10445.1870	0.0042
3	3	1	2.5	4	2	2	3.5	10450.2606	-0.0006
3	3	1	2.5	4	2	2	2.5	10457.7014	-0.0007
3	3	1	4.5	4	2	2	5.5	10460.9148	0.0059
3	3	1	1.5	4	2	2	2.5	10468.5933	-0.0027
4	0	4	2.5	3	0	3	2.5	10709.3641	0.0000
4	0	4	3.5	3	0	3	3.5	10711.1379	-0.0002
4	0	4	4.5	3	0	3	3.5	10712.8146	0.0008
3	3	0	3.5	4	2	3	4.5	10713.1386	0.0020
4	0	4	3.5	3	0	3	2.5	10714.2112	0.0006
4	0	4	5.5	3	0	3	4.5	10714.5987	0.0016
4	0	4	2.5	3	0	3	1.5	10715.9842	-0.0001
3	3	0	2.5	4	2	3	3.5	10719.3619	-0.0008
3	3	0	2.5	4	2	3	2.5	10722.7284	-0.0006
3	3	0	4.5	4	2	3	5.5	10727.3488	0.0054
3	3	0	1.5	4	2	3	2.5	10733.5946	-0.0037
7	2	5	8.5	7	1	6	7.5	10773.7736	0.0040
7	2	5	5.5	7	1	6	6.5	10774.0802	-0.0012

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
7	2	5	6.5	7	1	6	7.5	10786.4164	-0.0031
7	2	5	7.5	7	1	6	7.5	10789.6512	-0.0017
7	2	5	6.5	7	1	6	6.5	10789.9607	-0.0017
7	2	5	8.5	7	1	6	8.5	10791.1558	0.0013
7	2	5	5.5	7	1	6	5.5	10791.4552	0.0005
7	2	5	7.5	7	1	6	6.5	10793.1968	0.0011
7	2	5	7.5	7	1	6	8.5	10807.0357	-0.0020
7	2	5	6.5	7	1	6	5.5	10807.3367	0.0010
4	2	3	2.5	3	2	2	1.5	10874.9506	0.0010
4	2	3	5.5	3	2	2	4.5	10876.1421	0.0006
4	2	3	3.5	3	2	2	2.5	10878.3231	0.0015
4	2	3	4.5	3	2	2	3.5	10879.4849	-0.0002
6	2	4	7.5	6	1	5	6.5	10901.1872	0.0043
6	2	4	4.5	6	1	5	5.5	10902.2865	-0.0015
6	2	4	5.5	6	1	5	6.5	10911.6411	-0.0033
6	2	4	6.5	6	1	5	6.5	10914.8830	-0.0014
6	2	4	5.5	6	1	5	5.5	10915.9762	-0.0018
6	2	4	6.5	6	1	5	5.5	10919.2190	0.0008
6	2	4	7.5	6	1	5	7.5	10919.4881	0.0022
6	2	4	4.5	6	1	5	4.5	10920.5743	0.0000
6	2	4	6.5	6	1	5	7.5	10933.1845	-0.0030
6	2	4	5.5	6	1	5	4.5	10934.2650	0.0007
4	2	2	2.5	3	2	1	1.5	11051.2112	0.0012
4	2	2	5.5	3	2	1	4.5	11052.7432	0.0000
4	2	2	3.5	3	2	1	2.5	11056.3401	-0.0005
4	2	2	4.5	3	2	1	3.5	11057.8773	0.0002
5	2	3	6.5	5	1	4	5.5	11210.9697	0.0040
5	2	3	3.5	5	1	4	4.5	11213.2279	-0.0010
5	2	3	4.5	5	1	4	5.5	11218.8319	-0.0027
5	2	3	5.5	5	1	4	5.5	11221.9277	-0.0015
5	2	3	4.5	5	1	4	4.5	11224.1728	-0.0018
5	2	3	5.5	5	1	4	4.5	11227.2705	0.0013
5	2	3	6.5	5	1	4	6.5	11229.8757	0.0024
5	2	3	3.5	5	1	4	3.5	11232.1150	0.0000
5	2	3	5.5	5	1	4	6.5	11240.8347	-0.0021
5	2	3	4.5	5	1	4	3.5	11243.0615	0.0007
4	1	3	5.5	3	1	2	4.5	11498.1342	0.0019
4	1	3	4.5	3	1	2	3.5	11498.5343	0.0007
4	1	3	2.5	3	1	2	1.5	11500.1492	-0.0007
4	1	3	3.5	3	1	2	2.5	11500.5688	0.0002
3	1	3	3.5	2	0	2	2.5	11516.0161	-0.0005
4	1	3	4.5	3	1	2	4.5	11517.2514	0.0007

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
3	1	3	2.5	2	0	2	2.5	11518.7714	-0.0017
3	1	3	3.5	2	0	2	3.5	11524.0176	0.0001
3	1	3	2.5	2	0	2	1.5	11524.4659	-0.0002
3	1	3	1.5	2	0	2	2.5	11524.6775	-0.0043
3	1	3	2.5	2	0	2	3.5	11526.7729	-0.0012
3	1	3	4.5	2	0	2	3.5	11529.8968	0.0026
3	1	3	1.5	2	0	2	1.5	11530.3734	-0.0013
3	1	3	1.5	2	0	2	0.5	11538.3860	0.0002
4	2	2	5.5	4	1	3	4.5	11627.7888	0.0050
4	2	2	2.5	4	1	3	3.5	11631.8975	-0.0004
4	2	2	3.5	4	1	3	4.5	11632.6269	-0.0029
4	2	2	4.5	4	1	3	4.5	11635.2509	-0.0012
4	2	2	3.5	4	1	3	3.5	11639.3373	-0.0016
4	2	2	4.5	4	1	3	3.5	11641.9619	0.0008
4	2	2	5.5	4	1	3	5.5	11646.9054	0.0032
4	2	2	2.5	4	1	3	2.5	11651.0066	0.0001
4	2	2	4.5	4	1	3	5.5	11654.3690	-0.0014
4	2	2	3.5	4	1	3	2.5	11658.4478	0.0004
3	2	1	4.5	3	1	2	3.5	12073.5802	0.0059
3	2	1	2.5	3	1	2	3.5	12074.8207	-0.0021
3	2	1	3.5	3	1	2	3.5	12075.9077	-0.0008
3	2	1	1.5	3	1	2	2.5	12081.2563	-0.0001
3	2	1	2.5	3	1	2	2.5	12083.5662	-0.0007
3	2	1	3.5	3	1	2	2.5	12084.6538	0.0013
3	2	1	4.5	3	1	2	4.5	12092.2958	0.0044
3	2	1	3.5	3	1	2	4.5	12094.6246	-0.0011
3	2	1	1.5	3	1	2	1.5	12099.9466	0.0004
3	2	1	2.5	3	1	2	1.5	12102.2573	0.0006
2	2	0	2.5	2	1	1	2.5	12469.8347	-0.0001
2	2	0	1.5	2	1	1	2.5	12475.5430	-0.0022
2	2	0	3.5	2	1	1	2.5	12477.8255	0.0064
2	2	0	2.5	2	1	1	1.5	12481.8425	0.0012
2	2	0	2.5	2	1	1	3.5	12486.6228	-0.0015
2	2	0	1.5	2	1	1	1.5	12487.5499	-0.0019
2	2	0	3.5	2	1	1	3.5	12494.6135	0.0049
2	2	0	0.5	2	1	1	1.5	12495.5624	-0.0018
2	2	0	1.5	2	1	1	0.5	12504.3006	-0.0006
2	2	0	0.5	2	1	1	0.5	12512.3129	-0.0008
5	1	5	4.5	4	1	4	3.5	12734.1720	0.0007
5	1	5	3.5	4	1	4	2.5	12734.2158	0.0030
5	1	5	5.5	4	1	4	4.5	12734.5304	0.0008
5	1	5	6.5	4	1	4	5.5	12734.5784	0.0001

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
5	0	5	5.5	4	0	4	4.5	13267.0123	0.0002
5	0	5	4.5	4	0	4	3.5	13267.9263	-0.0003
5	0	5	6.5	4	0	4	5.5	13269.0781	0.0013
5	0	5	3.5	4	0	4	2.5	13269.9779	-0.0001
6	0	6	4.5	5	1	5	3.5	13361.2947	0.0000
6	0	6	7.5	5	1	5	6.5	13363.0341	0.0002
6	0	6	6.5	5	1	5	6.5	13363.6076	-0.0017
6	0	6	4.5	5	1	5	4.5	13366.7537	-0.0009
6	0	6	5.5	5	1	5	4.5	13367.4061	0.0005
6	0	6	5.5	5	1	5	5.5	13368.9475	0.0000
6	0	6	6.5	5	1	5	5.5	13369.0547	0.0011
2	2	1	2.5	2	1	2	3.5	13429.2939	-0.0021
2	2	1	1.5	2	1	2	0.5	13430.0182	-0.0005
2	2	1	2.5	2	1	2	1.5	13431.4929	0.0012
2	2	1	2.5	2	1	2	2.5	13437.1159	0.0001
2	2	1	1.5	2	1	2	1.5	13437.8752	-0.0008
2	2	1	3.5	2	1	2	3.5	13438.2271	0.0045
2	2	1	0.5	2	1	2	0.5	13438.9569	-0.0011
2	2	1	1.5	2	1	2	2.5	13443.4980	-0.0022
2	2	1	3.5	2	1	2	2.5	13446.0493	0.0069
2	2	1	0.5	2	1	2	1.5	13446.8142	-0.0012
5	2	4	3.5	4	2	3	2.5	13572.6938	0.0020
5	2	4	6.5	4	2	3	5.5	13572.9074	0.0013
5	2	4	4.5	4	2	3	3.5	13574.1834	-0.0006
5	2	4	5.5	4	2	3	4.5	13574.3182	0.0007
4	1	4	4.5	3	0	3	3.5	13632.5302	0.0003
4	1	4	3.5	3	0	3	3.5	13634.4285	-0.0017
4	1	4	3.5	3	0	3	2.5	13637.5026	-0.0002
4	1	4	2.5	3	0	3	2.5	13642.9199	-0.0014
4	1	4	5.5	3	0	3	4.5	13644.5376	0.0029
4	1	4	2.5	3	0	3	1.5	13649.5421	0.0007
5	2	3	3.5	4	2	2	2.5	13916.6426	-0.0002
5	2	3	6.5	4	2	2	5.5	13917.1248	0.0001
5	2	3	4.5	4	2	2	3.5	13920.1483	0.0006
5	2	3	5.5	4	2	2	4.5	13920.6211	0.0012
3	2	2	1.5	3	1	3	1.5	13928.2496	0.0018
3	2	2	4.5	3	1	3	4.5	13931.0224	0.0038
3	2	2	2.5	3	1	3	2.5	13934.1494	-0.0013
3	2	2	3.5	3	1	3	3.5	13936.9032	0.0000
5	1	4	5.5	4	1	3	4.5	14333.9428	0.0000
5	1	4	6.5	4	1	3	5.5	14334.1541	0.0005
5	1	4	4.5	4	1	3	3.5	14335.3129	0.0010

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
5	1	4	3.5	4	1	3	2.5	14335.5343	0.0000
4	2	3	2.5	4	1	4	2.5	14592.2922	0.0011
4	2	3	5.5	4	1	4	5.5	14595.3909	0.0026
4	2	3	3.5	4	1	4	2.5	14595.6576	0.0003
4	2	3	2.5	4	1	4	3.5	14597.7093	-0.0002
4	2	3	4.5	4	1	4	5.5	14598.7366	-0.0033
4	2	3	5.5	4	1	4	4.5	14600.7892	0.0053
4	2	3	3.5	4	1	4	3.5	14601.0753	-0.0005
4	2	3	4.5	4	1	4	3.5	14602.2360	0.0007
4	2	3	3.5	4	1	4	4.5	14602.9735	-0.0026
4	2	3	4.5	4	1	4	4.5	14604.1350	-0.0006
6	1	6	5.5	5	1	5	4.5	15239.8356	0.0008
6	1	6	6.5	5	1	5	5.5	15240.0041	0.0014
6	1	6	4.5	5	1	5	3.5	15240.1112	0.0018
6	1	6	7.5	5	1	5	6.5	15240.3124	0.0005
5	2	4	3.5	5	1	5	3.5	15430.7712	0.0011
5	2	4	6.5	5	1	5	6.5	15433.7180	0.0018
5	2	4	4.5	5	1	5	3.5	15435.6297	0.0011
5	2	4	3.5	5	1	5	4.5	15436.2301	0.0001
5	2	4	5.5	5	1	5	6.5	15438.4754	-0.0037
5	2	4	6.5	5	1	5	5.5	15439.1654	0.0049
5	2	4	4.5	5	1	5	4.5	15441.0869	-0.0016
5	2	4	5.5	5	1	5	4.5	15442.3822	0.0007
5	2	4	4.5	5	1	5	5.5	15442.6275	-0.0029
5	2	4	5.5	5	1	5	5.5	15443.9218	-0.0016
5	1	5	5.5	4	0	4	4.5	15654.2459	0.0002
5	1	5	4.5	4	0	4	4.5	15655.7855	-0.0021
5	1	5	4.5	4	0	4	3.5	15657.4632	-0.0002
5	1	5	5.5	4	0	4	5.5	15659.0707	-0.0009
5	1	5	3.5	4	0	4	3.5	15662.9217	-0.0017
5	1	5	6.5	4	0	4	5.5	15664.5185	0.0027
5	1	5	3.5	4	0	4	2.5	15667.7703	0.0004
6	0	6	6.5	5	0	5	5.5	15756.2886	0.0014
6	0	6	5.5	5	0	5	4.5	15756.9433	0.0008
6	0	6	7.5	5	0	5	6.5	15758.4750	0.0021
6	0	6	4.5	5	0	5	3.5	15759.0867	0.0001
6	2	5	7.5	5	2	4	6.5	16254.5257	0.0020
6	2	5	6.5	5	2	4	5.5	16254.6440	-0.0006
6	2	5	5.5	5	2	4	4.5	16255.3338	0.0011
7	0	7	7.5	6	1	6	7.5	16312.1292	-0.0029
7	0	7	5.5	6	1	6	4.5	16312.4022	-0.0005
7	0	7	8.5	6	1	6	7.5	16314.1569	-0.0004

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
7	0	7	6.5	6	1	6	5.5	16317.3265	0.0003
7	0	7	7.5	6	1	6	6.5	16317.8857	0.0001
7	0	7	5.5	6	1	6	5.5	16318.1359	-0.0014
7	0	7	6.5	6	1	6	6.5	16318.6981	-0.0022
6	2	5	4.5	6	1	6	4.5	16444.7701	0.0006
6	2	5	7.5	6	1	6	7.5	16447.9295	0.0015
6	2	5	7.5	6	1	6	6.5	16453.6858	0.0042
6	2	5	5.5	6	1	6	5.5	16456.5845	-0.0019
6	2	5	6.5	6	1	6	5.5	16457.1916	0.0004
6	2	5	5.5	6	1	6	6.5	16457.9558	-0.0046
6	2	5	6.5	6	1	6	6.5	16458.5634	-0.0019
6	2	4	4.5	5	2	3	3.5	16829.9555	0.0008
6	2	4	7.5	5	2	3	6.5	16830.1066	0.0002
6	2	4	5.5	5	2	3	4.5	16832.7027	0.0037
6	2	4	6.5	5	2	3	5.5	16832.8451	0.0004
6	1	5	6.5	5	1	4	5.5	17139.8898	0.0005
6	1	5	7.5	5	1	4	6.5	17140.4920	-0.0019
6	1	5	5.5	5	1	4	4.5	17140.8950	-0.0006
6	1	5	4.5	5	1	4	3.5	17141.4964	0.0009
6	1	6	6.5	5	0	5	5.5	17627.2365	0.0003
6	1	6	5.5	5	0	5	5.5	17628.6085	-0.0018
6	1	6	5.5	5	0	5	4.5	17629.3714	-0.0003
6	1	6	6.5	5	0	5	6.5	17629.9964	-0.0010
7	2	6	5.5	7	1	7	5.5	17633.5456	0.0003
6	1	6	4.5	5	0	5	4.5	17635.1054	-0.0008
6	1	6	7.5	5	0	5	6.5	17635.7533	0.0024
7	2	6	8.5	7	1	7	8.5	17635.8825	0.0012
6	1	6	4.5	5	0	5	3.5	17637.9020	0.0008
7	2	6	6.5	7	1	7	6.5	17645.1548	-0.0010
7	2	6	7.5	7	1	7	7.5	17647.5907	-0.0023
7	1	7	6.5	6	1	6	5.5	17727.8819	0.0020
7	1	7	7.5	6	1	6	6.5	17727.9998	0.0014
7	1	7	5.5	6	1	6	4.5	17728.3304	0.0051
7	1	7	8.5	6	1	6	7.5	17728.4030	-0.0024
7	0	7	7.5	6	0	6	6.5	18188.8351	0.0004
7	0	7	6.5	6	0	6	5.5	18189.7556	0.0003
7	0	7	5.5	6	0	6	4.5	18191.2174	-0.0001
7	0	7	8.5	6	0	6	7.5	18191.4358	0.0005
2	2	1	2.5	1	1	0	1.5	18225.7654	0.0002
2	2	1	1.5	1	1	0	1.5	18232.1476	-0.0020
2	2	1	2.5	1	1	0	2.5	18233.5933	-0.0027
2	2	1	1.5	1	1	0	2.5	18239.9755	-0.0049

Table 3S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	1	0.5	1	1	0	1.5	18241.0869	-0.0020
2	2	1	3.5	1	1	0	2.5	18242.5267	0.0042
2	2	1	1.5	1	1	0	0.5	18246.2810	-0.0014
2	2	1	0.5	1	1	0	0.5	18255.2200	-0.0017
2	2	0	1.5	1	1	1	0.5	18562.4998	-0.0016
2	2	0	2.5	1	1	1	2.5	18570.2269	-0.0031
2	2	0	0.5	1	1	1	0.5	18570.5118	-0.0020
2	2	0	1.5	1	1	1	2.5	18575.9353	-0.0051
2	2	0	3.5	1	1	1	2.5	18578.2183	0.0040
2	2	0	2.5	1	1	1	1.5	18587.0021	0.0009
2	2	0	1.5	1	1	1	1.5	18592.7105	-0.0011
2	2	0	0.5	1	1	1	1.5	18600.7228	-0.0013
8	0	8	8.5	7	1	7	8.5	19167.0785	-0.0033
8	0	8	6.5	7	1	7	5.5	19169.7759	-0.0006
8	0	8	9.5	7	1	7	8.5	19170.3802	-0.0005
8	0	8	7.5	7	1	7	6.5	19172.5452	-0.0003
8	0	8	8.5	7	1	7	7.5	19173.2422	-0.0002
8	0	8	7.5	7	1	7	7.5	19173.7990	-0.0022
8	0	8	6.5	7	1	7	6.5	19175.9544	-0.0020
7	1	7	7.5	6	0	6	6.5	19598.9477	0.0003
7	1	7	7.5	6	0	6	7.5	19599.5203	-0.0025
7	1	7	6.5	6	0	6	5.5	19600.3087	-0.0003
7	1	7	8.5	6	0	6	7.5	19605.6858	0.0023
7	1	7	5.5	6	0	6	5.5	19606.4876	-0.0014
7	1	7	5.5	6	0	6	4.5	19607.1404	0.0004
3	2	2	3.5	2	1	1	2.5	20626.3430	-0.0007
3	2	2	2.5	2	1	1	1.5	20638.3528	-0.0014
3	2	2	4.5	2	1	1	3.5	20643.1291	0.0039
3	2	2	1.5	2	1	1	0.5	20655.1092	-0.0002

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	0	3.5	3	1	3	4.5	5530.7723	0.0017
6	1	5	4.5	5	2	4	3.5	6715.7884	-0.0004
6	1	5	7.5	5	2	4	6.5	6718.0210	-0.0011
6	1	5	5.5	5	2	4	4.5	6726.2039	0.0018
6	1	5	6.5	5	2	4	5.5	6728.6670	0.0016
1	1	1	1.5	0	0	0	1.5	6738.2822	-0.0013
1	1	1	2.5	0	0	0	1.5	6751.4650	0.0019
1	1	1	0.5	0	0	0	1.5	6762.0195	-0.0014
4	3	2	4.5	5	2	3	5.5	7009.8756	-0.0028
4	3	2	3.5	5	2	3	4.5	7012.9991	-0.0019
4	3	2	5.5	5	2	3	6.5	7020.4900	0.0006
4	3	2	2.5	5	2	3	3.5	7023.6142	-0.0003
5	1	4	3.5	5	0	5	4.5	7123.0425	0.0002
5	1	4	3.5	5	0	5	3.5	7125.0812	-0.0008
5	1	4	6.5	5	0	5	5.5	7126.6516	-0.0006
5	1	4	6.5	5	0	5	6.5	7128.6707	0.0014
5	1	4	4.5	5	0	5	5.5	7137.2768	-0.0024
5	1	4	4.5	5	0	5	4.5	7137.8373	0.0003
5	1	4	4.5	5	0	5	3.5	7139.8787	0.0020
5	1	4	5.5	5	0	5	5.5	7141.4616	0.0012
5	1	4	5.5	5	0	5	4.5	7142.0208	0.0026
5	1	4	5.5	5	0	5	6.5	7143.4757	-0.0019
4	0	4	2.5	3	1	3	1.5	7293.7709	-0.0010
4	0	4	5.5	3	1	3	4.5	7297.2626	-0.0009
4	0	4	2.5	3	1	3	2.5	7298.4404	-0.0019
4	0	4	4.5	3	1	3	4.5	7300.9398	-0.0013
4	0	4	3.5	3	1	3	2.5	7302.1335	0.0006
4	0	4	3.5	3	1	3	3.5	7304.3119	-0.0002
4	0	4	4.5	3	1	3	3.5	7305.5924	0.0007
3	1	3	4.5	2	1	2	3.5	7604.2995	-0.0003
3	1	3	3.5	2	1	2	2.5	7605.8147	-0.0019
4	3	1	4.5	5	2	4	5.5	7650.2907	0.0003
4	3	1	3.5	5	2	4	4.5	7651.8443	0.0012
4	3	1	5.5	5	2	4	6.5	7655.7573	0.0011
3	0	3	3.5	2	0	2	2.5	8026.7862	-0.0016
3	0	3	4.5	2	0	2	3.5	8027.9167	0.0027
3	0	3	2.5	2	0	2	1.5	8028.8565	0.0036
3	0	3	1.5	2	0	2	0.5	8029.9794	0.0008
6	1	5	4.5	6	0	6	4.5	8522.8695	-0.0012
6	1	5	7.5	6	0	6	7.5	8526.1490	-0.0011
6	1	5	5.5	6	0	6	5.5	8536.8426	0.0003
6	1	5	6.5	6	0	6	6.5	8540.1853	-0.0008



Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
3	1	2	4.5	2	1	1	3.5	8575.3689	-0.0019
3	1	2	3.5	2	1	1	2.5	8576.8720	-0.0007
3	1	2	1.5	2	1	1	0.5	8577.9304	-0.0006
3	1	2	2.5	2	1	1	1.5	8579.4421	0.0010
2	1	2	2.5	1	0	1	1.5	9115.3148	-0.0011
2	1	2	1.5	1	0	1	1.5	9119.7437	-0.0017
2	1	2	2.5	1	0	1	2.5	9122.3177	-0.0006
2	1	2	0.5	1	0	1	1.5	9125.9345	-0.0018
2	1	2	1.5	1	0	1	2.5	9126.7459	-0.0019
2	1	2	3.5	1	0	1	2.5	9128.4878	0.0019
2	1	2	1.5	1	0	1	0.5	9132.3469	-0.0001
2	1	2	0.5	1	0	1	0.5	9138.5376	-0.0003
3	3	1	3.5	4	2	2	4.5	9986.4713	0.0014
3	3	1	2.5	4	2	2	3.5	9992.5343	-0.0010
3	3	1	4.5	4	2	2	5.5	10000.9425	0.0026
3	3	1	1.5	4	2	2	2.5	10006.9947	-0.0022
4	1	4	2.5	3	1	3	1.5	10118.0880	0.0013
4	1	4	3.5	3	1	3	2.5	10118.4611	0.0010
4	1	4	5.5	3	1	3	4.5	10118.7658	0.0012
4	1	4	4.5	3	1	3	3.5	10119.1341	0.0019
7	1	6	5.5	7	0	7	5.5	10256.3685	0.0005
7	1	6	8.5	7	0	7	8.5	10260.1176	-0.0021
3	3	0	3.5	4	2	3	4.5	10265.6641	0.0014
3	3	0	2.5	4	2	3	3.5	10270.5360	-0.0017
7	1	6	6.5	7	0	7	6.5	10271.9506	0.0009
7	1	6	7.5	7	0	7	7.5	10274.5016	-0.0018
3	3	0	4.5	4	2	3	5.5	10276.7865	0.0040
3	3	0	1.5	4	2	3	2.5	10281.6751	-0.0024
5	0	5	3.5	4	1	4	2.5	10323.0637	-0.0006
5	0	5	6.5	4	1	4	5.5	10325.1649	-0.0007
5	0	5	5.5	4	1	4	5.5	10327.1807	-0.0020
5	0	5	3.5	4	1	4	3.5	10327.3598	-0.0014
5	0	5	4.5	4	1	4	3.5	10329.4010	0.0001
5	0	5	4.5	4	1	4	4.5	10330.9078	-0.0002
5	0	5	5.5	4	1	4	4.5	10331.4663	0.0006
7	1	6	5.5	6	2	5	4.5	10345.0557	-0.0020
7	1	6	6.5	6	2	5	5.5	10355.1350	0.0016
7	1	6	7.5	6	2	5	6.5	10356.2296	0.0018
7	2	5	7.5	7	1	6	7.5	10518.5522	-0.0008
7	2	5	6.5	7	1	6	6.5	10518.7498	-0.0010
7	2	5	8.5	7	1	6	8.5	10519.5070	0.0020
7	2	5	5.5	7	1	6	5.5	10519.6935	0.0011

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
6	2	4	7.5	6	1	5	6.5	10609.4660	0.0041
6	2	4	4.5	6	1	5	5.5	10610.2805	-0.0009
6	2	4	5.5	6	1	5	6.5	10617.7750	-0.0024
4	0	4	4.5	3	0	3	3.5	10618.1410	0.0011
4	0	4	3.5	3	0	3	2.5	10619.2422	0.0009
4	0	4	5.5	3	0	3	4.5	10619.5801	-0.0002
6	2	4	6.5	6	1	5	6.5	10620.3511	-0.0014
4	0	4	2.5	3	0	3	1.5	10620.6765	0.0009
6	2	4	5.5	6	1	5	5.5	10621.1636	-0.0013
6	2	4	7.5	6	1	5	7.5	10623.7710	0.0014
6	2	4	4.5	6	1	5	4.5	10624.5786	0.0005
6	2	4	6.5	6	1	5	7.5	10634.6574	-0.0028
6	2	4	5.5	6	1	5	4.5	10635.4611	-0.0005
5	2	3	6.5	5	1	4	5.5	10902.9717	0.0036
5	2	3	3.5	5	1	4	4.5	10904.6962	-0.0022
5	2	3	4.5	5	1	4	5.5	10909.2268	-0.0027
5	2	3	5.5	5	1	4	5.5	10911.6909	-0.0004
5	2	3	4.5	5	1	4	4.5	10913.4093	-0.0014
5	2	3	5.5	5	1	4	4.5	10915.8728	0.0004
5	2	3	6.5	5	1	4	6.5	10917.7781	0.0018
5	2	3	5.5	5	1	4	6.5	10926.4969	-0.0026
5	2	3	4.5	5	1	4	3.5	10928.2063	0.0010
4	2	2	5.5	4	1	3	4.5	11310.3519	0.0038
4	2	2	2.5	4	1	3	3.5	11313.5351	-0.0003
4	2	2	3.5	4	1	3	4.5	11314.2078	-0.0017
4	2	2	4.5	4	1	3	4.5	11316.2971	-0.0010
4	2	2	3.5	4	1	3	3.5	11319.4669	-0.0014
4	2	2	4.5	4	1	3	3.5	11321.5572	0.0003
4	2	2	5.5	4	1	3	5.5	11325.3419	0.0025
4	2	2	2.5	4	1	3	2.5	11328.5273	-0.0001
4	2	2	4.5	4	1	3	5.5	11331.2877	-0.0017
4	2	2	3.5	4	1	3	2.5	11334.4597	-0.0005
3	1	3	3.5	2	0	2	2.5	11339.3354	-0.0005
3	1	3	2.5	2	0	2	2.5	11341.5138	-0.0012
3	1	3	3.5	2	0	2	3.5	11345.5798	-0.0004
3	1	3	2.5	2	0	2	1.5	11345.9608	-0.0005
3	1	3	1.5	2	0	2	2.5	11346.1843	-0.0011
3	1	3	2.5	2	0	2	3.5	11347.7588	-0.0005
3	1	3	4.5	2	0	2	3.5	11350.2328	0.0021
3	1	3	1.5	2	0	2	1.5	11350.6312	-0.0005
3	1	3	1.5	2	0	2	0.5	11356.8824	0.0001
4	1	3	5.5	3	1	2	4.5	11410.8247	0.0010

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
4	1	3	4.5	3	1	2	3.5	11411.1228	0.0009
4	1	3	2.5	3	1	2	1.5	11412.4116	0.0017
4	1	3	3.5	3	1	2	2.5	11412.7269	0.0010
3	2	1	4.5	3	1	2	3.5	11751.8475	0.0048
3	2	1	2.5	3	1	2	3.5	11752.8523	-0.0018
3	2	1	3.5	3	1	2	3.5	11753.7288	-0.0008
3	2	1	1.5	3	1	2	2.5	11757.8375	-0.0003
3	2	1	2.5	3	1	2	2.5	11759.7156	-0.0012
3	2	1	3.5	3	1	2	2.5	11760.5935	0.0012
3	2	1	4.5	3	1	2	4.5	11766.5387	0.0029
3	2	1	3.5	3	1	2	4.5	11768.4216	-0.0011
3	2	1	1.5	3	1	2	1.5	11772.5137	-0.0001
3	2	1	2.5	3	1	2	1.5	11774.3932	0.0003
2	2	0	2.5	2	1	1	2.5	12148.3851	0.0001
2	2	0	1.5	2	1	1	2.5	12152.8400	-0.0021
2	2	0	3.5	2	1	1	2.5	12154.6241	0.0051
2	2	0	2.5	2	1	1	1.5	12157.8164	0.0004
2	2	0	2.5	2	1	1	3.5	12161.5749	-0.0012
2	2	0	1.5	2	1	1	1.5	12162.2716	-0.0016
2	2	0	3.5	2	1	1	3.5	12167.8143	0.0041
2	2	0	0.5	2	1	1	1.5	12168.5228	-0.0019
2	2	0	1.5	2	1	1	0.5	12175.4387	-0.0005
2	2	0	0.5	2	1	1	0.5	12181.6895	-0.0011
5	1	5	4.5	4	1	4	3.5	12617.0596	0.0005
5	1	5	3.5	4	1	4	2.5	12617.1040	0.0008
5	1	5	5.5	4	1	4	4.5	12617.3412	0.0011
5	1	5	6.5	4	1	4	5.5	12617.3890	-0.0001
2	2	1	2.5	2	1	2	3.5	13109.5896	-0.0017
2	2	1	1.5	2	1	2	0.5	13110.1409	-0.0005
2	2	1	2.5	2	1	2	1.5	13111.3305	0.0012
2	2	1	2.5	2	1	2	2.5	13115.7596	0.0008
2	2	1	1.5	2	1	2	1.5	13116.3308	-0.0015
2	2	1	3.5	2	1	2	3.5	13116.5920	0.0040
2	2	1	0.5	2	1	2	0.5	13117.1450	-0.0009
2	2	1	1.5	2	1	2	2.5	13120.7599	-0.0019
2	2	1	3.5	2	1	2	2.5	13122.7613	0.0058
2	2	1	0.5	2	1	2	1.5	13123.3354	-0.0014
5	0	5	5.5	4	0	4	4.5	13145.0071	0.0010
5	0	5	4.5	4	0	4	3.5	13145.7278	-0.0003
5	0	5	6.5	4	0	4	5.5	13146.6676	0.0011
5	0	5	3.5	4	0	4	2.5	13147.3795	0.0004
6	0	6	4.5	5	1	5	3.5	13314.1800	0.0002

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
6	0	6	7.5	5	1	5	6.5	13315.5125	0.0003
6	0	6	6.5	5	1	5	6.5	13315.7830	-0.0008
6	0	6	4.5	5	1	5	4.5	13318.5208	-0.0002
6	0	6	5.5	5	1	5	4.5	13318.8470	0.0008
6	0	6	5.5	5	1	5	5.5	13320.0702	-0.0020
6	0	6	6.5	5	1	5	5.5	13320.1166	0.0008
4	1	4	4.5	3	0	3	3.5	13431.6808	0.0004
4	1	4	3.5	3	0	3	3.5	13433.1865	-0.0009
4	1	4	3.5	3	0	3	2.5	13435.5688	0.0003
4	1	4	4.5	3	0	3	4.5	13436.7989	0.0006
4	1	4	2.5	3	0	3	2.5	13439.8648	-0.0007
4	1	4	5.5	3	0	3	4.5	13441.0840	0.0026
4	1	4	2.5	3	0	3	1.5	13444.9910	0.0007
3	2	2	1.5	3	1	3	1.5	13610.2124	0.0003
3	2	2	4.5	3	1	3	4.5	13612.4031	0.0028
3	2	2	2.5	3	1	3	2.5	13614.8792	-0.0003
3	2	2	3.5	3	1	3	3.5	13617.0561	0.0005
5	1	4	5.5	4	1	3	4.5	14223.2623	0.0009
5	1	4	6.5	4	1	3	5.5	14223.4460	0.0015
5	1	4	4.5	4	1	3	3.5	14224.3383	-0.0008
5	1	4	3.5	4	1	3	2.5	14224.5352	-0.0013
4	2	3	2.5	4	1	4	2.5	14278.1157	0.0008
4	2	3	5.5	4	1	4	5.5	14280.5576	0.0023
4	2	3	3.5	4	1	4	2.5	14280.7457	-0.0009
4	2	3	2.5	4	1	4	3.5	14282.4127	0.0008
4	2	3	4.5	4	1	4	5.5	14283.1729	-0.0029
4	2	3	5.5	4	1	4	4.5	14284.8426	0.0044
4	2	3	3.5	4	1	4	3.5	14285.0432	-0.0003
4	2	3	4.5	4	1	4	3.5	14285.9528	0.0012
4	2	3	3.5	4	1	4	4.5	14286.5491	-0.0015
4	2	3	4.5	4	1	4	4.5	14287.4583	-0.0003
6	1	6	5.5	5	1	5	4.5	15098.1552	0.0003
6	1	6	7.5	5	1	5	6.5	15098.5461	0.0004
5	2	4	3.5	5	1	5	3.5	15121.2630	0.0013
5	2	4	6.5	5	1	5	6.5	15123.6418	0.0017
5	2	4	4.5	5	1	5	4.5	15129.4856	-0.0008
5	2	4	5.5	5	1	5	5.5	15131.6355	-0.0010
5	1	5	5.5	4	0	4	4.5	15430.8806	0.0000
5	1	5	4.5	4	0	4	4.5	15432.1050	-0.0016
5	1	5	4.5	4	0	4	3.5	15433.3860	-0.0002
5	1	5	5.5	4	0	4	5.5	15434.5571	-0.0010
5	1	5	3.5	4	0	4	3.5	15437.7278	0.0004

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
5	1	5	6.5	4	0	4	5.5	15438.8924	0.0023
5	1	5	3.5	4	0	4	2.5	15441.4188	0.0008
6	0	6	6.5	5	0	5	5.5	15605.9915	0.0013
6	0	6	5.5	5	0	5	4.5	15606.5040	-0.0004
6	0	6	7.5	5	0	5	6.5	15607.7362	0.0004
6	0	6	4.5	5	0	5	3.5	15608.2180	-0.0009
6	2	5	4.5	6	1	6	4.5	16140.8758	0.0012
6	2	5	7.5	6	1	6	7.5	16142.3114	0.0004
6	2	5	5.5	6	1	6	5.5	16148.8242	-0.0015
6	2	5	6.5	6	1	6	6.5	16151.6398	-0.0015
7	0	7	8.5	6	1	6	7.5	16229.5504	-0.0005
7	0	7	5.5	6	1	6	4.5	16229.5649	0.0006
7	0	7	6.5	6	1	6	5.5	16232.0091	-0.0002
7	0	7	7.5	6	1	6	6.5	16233.3664	0.0007
7	0	7	5.5	6	1	6	5.5	16234.0434	-0.0014
7	2	6	5.5	7	1	7	5.5	17335.7407	0.0010
7	2	6	8.5	7	1	7	8.5	17337.5931	0.0033
7	2	6	6.5	7	1	7	6.5	17344.8962	-0.0022
7	2	6	7.5	7	1	7	7.5	17346.8033	-0.0002
6	1	6	6.5	5	0	5	5.5	17384.1069	0.0001
6	1	6	5.5	5	0	5	5.5	17385.2545	-0.0008
6	1	6	5.5	5	0	5	4.5	17385.8130	-0.0001
6	1	6	6.5	5	0	5	6.5	17386.1244	0.0004
6	1	6	4.5	5	0	5	4.5	17390.2906	-0.0030
6	1	6	7.5	5	0	5	6.5	17390.7712	0.0019
6	1	6	4.5	5	0	5	3.5	17392.3334	0.0001
2	2	1	2.5	1	1	0	1.5	17859.5128	0.0005
2	2	1	1.5	1	1	0	1.5	17864.5138	-0.0013
2	2	1	2.5	1	1	0	2.5	17865.6846	-0.0019
2	2	1	1.5	1	1	0	2.5	17870.6865	-0.0030
2	2	1	0.5	1	1	0	1.5	17871.5169	-0.0028
2	2	1	3.5	1	1	0	2.5	17872.6863	0.0031
2	2	1	1.5	1	1	0	0.5	17875.6514	-0.0010
2	2	1	0.5	1	1	0	0.5	17882.6556	-0.0014
2	2	0	1.5	1	1	1	0.5	18199.2268	-0.0011
2	2	0	2.5	1	1	1	2.5	18205.3260	-0.0025
2	2	0	0.5	1	1	1	0.5	18205.4773	-0.0019
2	2	0	1.5	1	1	1	2.5	18209.7815	-0.0041
2	2	0	3.5	1	1	1	2.5	18211.5654	0.0029
2	2	0	2.5	1	1	1	1.5	18218.5094	0.0013
2	2	0	1.5	1	1	1	1.5	18222.9643	-0.0009
2	2	0	0.5	1	1	1	1.5	18229.2153	-0.0013

Table 4S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
8	0	8	6.5	7	1	7	5.5	19046.2535	-0.0014
8	0	8	9.5	7	1	7	8.5	19046.7222	-0.0005
8	0	8	7.5	7	1	7	6.5	19048.3210	-0.0009
8	0	8	8.5	7	1	7	7.5	19048.8396	-0.0002
7	1	7	7.5	6	0	6	6.5	19339.5826	-0.0003
7	1	7	6.5	6	0	6	5.5	19340.6275	-0.0006
7	1	7	8.5	6	0	6	7.5	19344.7720	0.0018
7	1	7	5.5	6	0	6	4.5	19345.8814	0.0003
3	2	2	3.5	2	1	1	2.5	20236.2528	-0.0006
3	2	2	2.5	2	1	1	1.5	20245.6871	-0.0004
3	2	2	4.5	2	1	1	3.5	20249.4433	0.0035
3	2	2	1.5	2	1	1	0.5	20258.8562	-0.0003

Table 5S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub><sup>13</sup>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
1	1	1	1.5	0	0	0	1.5	6829.5411	-0.0009
1	1	1	2.5	0	0	0	1.5	6846.3409	0.0040
1	1	1	0.5	0	0	0	1.5	6859.7905	-0.0045
2	1	2	2.5	1	0	1	1.5	9223.2007	0.0012
2	1	2	1.5	1	0	1	1.5	9228.8256	-0.0012
2	1	2	2.5	1	0	1	2.5	9232.1543	-0.0006
2	1	2	3.5	1	0	1	2.5	9239.9813	0.0025
2	1	2	1.5	1	0	1	0.5	9244.9391	-0.0023
2	1	2	0.5	1	0	1	0.5	9252.8034	0.0001
5	0	5	6.5	4	1	4	5.5	10329.9498	-0.0003
5	0	5	4.5	4	1	4	3.5	10335.4286	0.0017
5	0	5	5.5	4	1	4	4.5	10338.0808	-0.0005
3	1	3	3.5	2	0	2	2.5	11464.8108	-0.0010
3	1	3	2.5	2	0	2	1.5	11473.2713	0.0010
4	2	2	4.5	4	1	3	4.5	11548.0809	0.0017
4	2	2	3.5	4	1	3	3.5	11552.1588	-0.0012
4	2	2	5.5	4	1	3	5.5	11559.7148	0.0023
4	2	2	2.5	4	1	3	2.5	11563.8097	-0.0021
3	2	1	3.5	3	1	2	3.5	11987.4763	0.0003
3	2	1	2.5	3	1	2	2.5	11995.1358	-0.0020
3	2	1	4.5	3	1	2	4.5	12003.8676	0.0023
3	2	1	1.5	3	1	2	1.5	12011.5199	-0.0028
2	2	0	2.5	2	1	1	2.5	12380.9512	-0.0006
2	2	0	3.5	2	1	1	3.5	12405.7617	0.0010
6	0	6	4.5	5	1	5	3.5	13342.1216	-0.0004
6	0	6	7.5	5	1	5	6.5	13343.8554	0.0000
6	0	6	5.5	5	1	5	4.5	13348.1954	-0.0055
2	2	1	2.5	2	1	2	2.5	13348.5440	0.0002
2	2	1	3.5	2	1	2	3.5	13349.6678	0.0021
6	0	6	6.5	5	1	5	5.5	13349.8426	0.0026
4	1	4	4.5	3	0	3	3.5	13574.2699	-0.0007
4	1	4	3.5	3	0	3	3.5	13576.1722	0.0003
4	1	4	3.5	3	0	3	2.5	13579.2441	-0.0001
4	1	4	5.5	3	0	3	4.5	13586.2805	0.0026
4	1	4	2.5	3	0	3	1.5	13591.2855	-0.0004
3	2	2	1.5	3	1	3	1.5	13839.9861	-0.0014
3	2	2	4.5	3	1	3	4.5	13842.7585	-0.0008
3	2	2	2.5	3	1	3	2.5	13845.8907	-0.0017
3	2	2	3.5	3	1	3	3.5	13848.6458	0.0000
4	2	3	5.5	4	1	4	5.5	14507.5665	0.0033
4	2	3	4.5	4	1	4	4.5	14516.3174	-0.0018
5	1	5	5.5	4	0	4	4.5	15589.3728	-0.0001

Table 5S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub><sup>13</sup>CH<sup>35</sup>Cl-HCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
5	1	5	4.5	4	0	4	3.5	15592.5865	-0.0008
5	1	5	6.5	4	0	4	5.5	15599.6359	0.0016
5	1	5	3.5	4	0	4	2.5	15602.8844	-0.0011
7	0	7	5.5	6	1	6	4.5	16281.9222	-0.0003
7	0	7	8.5	6	1	6	7.5	16284.1559	0.0008
7	0	7	6.5	6	1	6	5.5	16287.2695	0.0009
7	0	7	7.5	6	1	6	6.5	16287.4619	0.0004
6	1	6	6.5	5	0	5	5.5	17556.4535	-0.0007
6	1	6	5.5	5	0	5	4.5	17558.5863	-0.0003
6	1	6	7.5	5	0	5	6.5	17564.9538	0.0012
6	1	6	4.5	5	0	5	3.5	17567.0918	-0.0007
2	2	1	2.5	1	1	0	1.5	18122.7475	-0.0021
2	2	1	3.5	1	1	0	2.5	18139.5326	0.0019
2	2	0	3.5	1	1	1	2.5	18475.5039	0.0024
2	2	0	2.5	1	1	1	1.5	18484.3001	-0.0007
3	2	2	3.5	2	1	1	2.5	20516.1084	-0.0025
3	2	2	2.5	2	1	1	1.5	20528.1388	0.0002
3	2	2	4.5	2	1	1	3.5	20532.9182	0.0020



Table 6S: Observed Transition Frequencies (in MHz) for  $^{13}\text{CH}_2\text{CH}^{35}\text{Cl-HCCH}$  Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
1	1	1	1.5	0	0	0	1.5	6701.2672	-0.0031
1	1	1	2.5	0	0	0	1.5	6718.1127	0.0033
1	1	1	0.5	0	0	0	1.5	6731.5973	-0.0053
4	0	4	5.5	3	1	3	4.5	7273.4921	0.0007
4	0	4	3.5	3	1	3	2.5	7279.7054	-0.0034
4	0	4	4.5	3	1	3	3.5	7284.1100	-0.0008
2	1	2	2.5	1	0	1	1.5	9068.4505	0.0030
2	1	2	1.5	1	0	1	1.5	9074.0688	0.0002
2	1	2	2.5	1	0	1	2.5	9077.4563	0.0003
2	1	2	3.5	1	0	1	2.5	9085.2742	0.0035
2	1	2	1.5	1	0	1	0.5	9090.2745	-0.0039
2	1	2	0.5	1	0	1	0.5	9098.1301	-0.0016
5	0	5	3.5	4	1	4	2.5	10286.1710	0.0021
5	0	5	6.5	4	1	4	5.5	10288.8511	-0.0013
5	0	5	4.5	4	1	4	3.5	10294.2525	0.0003
5	0	5	5.5	4	1	4	4.5	10296.8740	-0.0003
4	2	2	4.5	4	1	3	4.5	11248.5442	-0.0049
4	2	2	3.5	4	1	3	3.5	11252.5997	0.0006
4	2	2	5.5	4	1	3	5.5	11260.1010	0.0042
4	2	2	2.5	4	1	3	2.5	11264.1705	0.0012
3	1	3	3.5	2	0	2	2.5	11283.6279	-0.0029
3	1	3	2.5	2	0	2	1.5	11292.1004	-0.0016
3	1	3	4.5	2	0	2	3.5	11297.5346	0.0025
3	1	3	1.5	2	0	2	0.5	11306.0487	-0.0001
3	2	1	3.5	3	1	2	3.5	11683.3317	0.0007
3	2	1	2.5	3	1	2	2.5	11690.9852	-0.0024
3	2	1	4.5	3	1	2	4.5	11699.7095	0.0030
3	2	1	1.5	3	1	2	1.5	11707.3514	-0.0040
2	2	0	2.5	2	1	1	2.5	12075.0432	-0.0010
2	2	1	3.5	2	1	2	3.5	13044.4148	0.0025
6	0	6	4.5	5	1	5	3.5	13264.6981	0.0021
6	0	6	7.5	5	1	5	6.5	13266.4053	0.0001
6	0	6	5.5	5	1	5	4.5	13270.6492	-0.0009
6	0	6	6.5	5	1	5	5.5	13272.2548	0.0012
4	1	4	3.5	3	0	3	2.5	13372.2844	0.0012
4	1	4	5.5	3	0	3	4.5	13379.3084	0.0036
4	1	4	2.5	3	0	3	1.5	13384.3047	-0.0014
3	2	2	1.5	3	1	3	1.5	13535.5629	0.0013
3	2	2	4.5	3	1	3	4.5	13538.3289	0.0019
3	2	2	2.5	3	1	3	2.5	13541.4475	-0.0048
3	2	2	3.5	3	1	3	3.5	13544.2004	0.0018
4	2	3	5.5	4	1	4	5.5	14204.3514	0.0019

Table 6S: Observed Transition Frequencies (in MHz) for  $^{13}\text{CH}_2\text{CH}^{35}\text{Cl-HCCH}$  Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
4	2	3	4.5	4	1	4	4.5	14213.1084	-0.0018
5	1	5	5.5	4	0	4	4.5	15358.2351	-0.0005
5	1	5	4.5	4	0	4	3.5	15361.4318	0.0016
5	1	5	6.5	4	0	4	5.5	15368.4432	0.0026
5	1	5	3.5	4	0	4	2.5	15371.6725	-0.0015
7	0	7	8.5	6	1	6	7.5	16167.5773	-0.0018
7	0	7	5.5	6	1	6	4.5	16167.7826	-0.0008
7	0	7	6.5	6	1	6	5.5	16170.7130	0.0002
7	0	7	7.5	6	1	6	6.5	16172.5245	0.0009
6	1	6	6.5	5	0	5	5.5	17303.4701	-0.0006
6	1	6	5.5	5	0	5	4.5	17305.7035	-0.0010
6	1	6	7.5	5	0	5	6.5	17312.0188	0.0002
2	2	1	2.5	1	1	0	1.5	17764.4813	-0.0015
2	2	1	3.5	1	1	0	2.5	17781.3114	0.0031
2	2	0	3.5	1	1	1	2.5	18118.1067	0.0003
2	2	0	2.5	1	1	1	1.5	18126.9234	0.0006
3	2	2	3.5	2	1	1	2.5	20131.3760	-0.0023
3	2	2	2.5	2	1	1	1.5	20143.4319	-0.0058
3	2	2	4.5	2	1	1	3.5	20148.2330	0.0054

Table 7S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>CCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
1	1	1	1.5	0	0	0	1.5	6838.6809	-0.0003
1	1	1	2.5	0	0	0	1.5	6855.4788	0.0029
1	1	1	0.5	0	0	0	1.5	6868.9310	-0.0027
4	0	4	5.5	3	1	3	4.5	7062.1487	0.0003
4	0	4	3.5	3	1	3	2.5	7068.5168	0.0001
4	0	4	4.5	3	1	3	3.5	7072.9972	-0.0002
2	1	2	2.5	1	0	1	1.5	9202.5368	0.0013
2	1	2	1.5	1	0	1	1.5	9208.1586	-0.0014
2	1	2	2.5	1	0	1	2.5	9211.4946	-0.0005
2	1	2	3.5	1	0	1	2.5	9219.3168	0.0023
2	1	2	0.5	1	0	1	0.5	9232.1369	-0.0027
5	0	5	3.5	4	1	4	2.5	10068.0678	0.0000
5	0	5	6.5	4	1	4	5.5	10070.8348	-0.0012
5	0	5	4.5	4	1	4	3.5	10076.4664	-0.0010
5	0	5	5.5	4	1	4	4.5	10079.1800	-0.0001
5	2	3	5.5	5	1	4	5.5	11299.1697	0.0002
5	2	3	4.5	5	1	4	4.5	11301.4839	-0.0017
5	2	3	6.5	5	1	4	6.5	11307.3662	0.0027
3	1	3	2.5	2	0	2	2.5	11421.8891	0.0013
3	1	3	3.5	2	0	2	3.5	11427.1950	-0.0013
3	1	3	2.5	2	0	2	1.5	11427.6202	-0.0010
3	1	3	4.5	2	0	2	3.5	11433.0519	-0.0053
3	1	3	1.5	2	0	2	1.5	11433.5146	-0.0002
3	1	3	1.5	2	0	2	0.5	11441.5819	-0.0008
4	2	2	4.5	4	1	3	4.5	11711.7555	-0.0005
4	2	2	3.5	4	1	3	3.5	11715.9057	-0.0031
4	2	2	5.5	4	1	3	5.5	11723.5927	0.0013
4	2	2	2.5	4	1	3	2.5	11727.7566	-0.0003
3	2	1	3.5	3	1	2	3.5	12144.7718	0.0003
3	2	1	2.5	3	1	2	2.5	12152.4825	-0.0019
3	2	1	4.5	3	1	2	4.5	12161.2785	0.0037
3	2	1	1.5	3	1	2	1.5	12168.9869	-0.0021
2	2	0	2.5	2	1	1	2.5	12528.5014	0.0001
2	2	0	3.5	2	1	1	3.5	12553.3569	0.0021
6	0	6	4.5	5	1	5	3.5	13050.1879	0.0003
6	0	6	7.5	5	1	5	6.5	13051.9709	0.0007
6	0	6	5.5	5	1	5	4.5	13056.5084	0.0015
6	0	6	6.5	5	1	5	5.5	13058.2069	0.0008
2	2	1	2.5	2	1	2	2.5	13465.3519	-0.0005
2	2	1	3.5	2	1	2	3.5	13466.4830	0.0001
4	1	4	4.5	3	0	3	3.5	13506.6137	0.0016
4	1	4	3.5	3	0	3	3.5	13508.5024	0.0010

Table 7S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>CCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	1	4	3.5	3	0	3	2.5	13511.6230	0.0001
4	1	4	4.5	3	0	3	4.5	13513.3273	0.0013
4	1	4	5.5	3	0	3	4.5	13518.6940	0.0037
4	1	4	2.5	3	0	3	1.5	13523.7361	0.0004
3	2	2	1.5	3	1	3	1.5	13939.9413	-0.0023
3	2	2	4.5	3	1	3	4.5	13942.7092	0.0020
3	2	2	2.5	3	1	3	2.5	13945.8280	-0.0026
3	2	2	3.5	3	1	3	3.5	13948.5762	-0.0004
4	2	3	5.5	4	1	4	5.5	14584.6602	0.0018
4	2	3	4.5	4	1	4	4.5	14593.3938	0.0011
5	1	5	5.5	4	0	4	4.5	15500.0838	0.0006
5	1	5	4.5	4	0	4	3.5	15503.3413	-0.0015
5	1	5	6.5	4	0	4	5.5	15510.4705	0.0025
5	1	5	3.5	4	0	4	2.5	15513.7647	-0.0005
7	0	7	5.5	6	1	6	4.5	15965.3598	-0.0011
7	0	7	8.5	6	1	6	7.5	15966.6970	-0.0012
7	0	7	6.5	6	1	6	5.5	15970.0655	-0.0003
7	0	7	7.5	6	1	6	6.5	15970.9990	0.0010
6	1	6	6.5	5	0	5	5.5	17442.9449	-0.0015
6	1	6	5.5	5	0	5	4.5	17445.1209	-0.0005
6	1	6	7.5	5	0	5	6.5	17451.6094	0.0009
2	2	1	2.5	1	1	0	1.5	18179.9562	-0.0001
2	2	1	3.5	1	1	0	2.5	18196.7391	0.0024
2	2	0	3.5	1	1	1	2.5	18520.6493	0.0021
2	2	0	2.5	1	1	1	1.5	18529.4022	0.0006
3	2	2	3.5	2	1	1	2.5	20543.5231	-0.0017
3	2	2	2.5	2	1	1	1.5	20555.5466	-0.0051
3	2	2	4.5	2	1	1	3.5	20560.3312	0.0018

Table 8S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HC<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
1	1	1	2.5	0	0	0	1.5	6832.3498	0.0026
1	1	1	0.5	0	0	0	1.5	6845.7478	-0.0023
4	0	4	5.5	3	1	3	4.5	6931.1536	0.0009
4	0	4	3.5	3	1	3	2.5	6937.5412	-0.0005
4	0	4	4.5	3	1	3	3.5	6942.0337	-0.0001
2	1	2	2.5	1	0	1	1.5	9156.0182	-0.0008
2	1	2	3.5	1	0	1	2.5	9172.7289	0.0002
2	1	2	0.5	1	0	1	0.5	9185.4954	-0.0035
5	0	5	3.5	4	1	4	2.5	9906.1901	-0.0023
5	0	5	6.5	4	1	4	5.5	9908.9779	-0.0015
5	0	5	4.5	4	1	4	3.5	9914.6577	-0.0016
5	0	5	5.5	4	1	4	4.5	9917.3932	0.0008
3	1	3	2.5	2	0	2	1.5	11360.3991	-0.0008
3	1	3	4.5	2	0	2	3.5	11365.8314	0.0015
3	1	3	1.5	2	0	2	0.5	11374.3241	0.0001
4	2	2	4.5	4	1	3	4.5	11741.6715	0.0001
4	2	2	3.5	4	1	3	3.5	11745.8372	-0.0002
4	2	2	5.5	4	1	3	5.5	11753.5461	0.0010
3	2	1	2.5	3	1	2	2.5	12177.5001	-0.0018
3	2	1	4.5	3	1	2	4.5	12186.2797	0.0018
3	2	1	1.5	3	1	2	1.5	12193.9773	-0.0023
2	2	0	2.5	2	1	1	2.5	12547.4388	-0.0013
2	2	0	3.5	2	1	1	3.5	12572.1777	0.0011
6	0	6	4.5	5	1	5	3.5	12860.6199	-0.0003
6	0	6	7.5	5	1	5	6.5	12862.4224	0.0004
6	0	6	5.5	5	1	5	4.5	12867.0337	0.0038
6	0	6	6.5	5	1	5	5.5	12868.7551	0.0017
4	1	4	3.5	3	0	3	2.5	13425.6929	-0.0003
4	1	4	5.5	3	0	3	4.5	13432.7598	0.0019
3	2	2	3.5	3	1	3	3.5	13939.9947	0.0008
5	1	5	5.5	4	0	4	4.5	15396.0296	0.0006
5	1	5	4.5	4	0	4	3.5	15399.2941	-0.0017
5	1	5	6.5	4	0	4	5.5	15406.4413	0.0034
5	1	5	3.5	4	0	4	2.5	15409.7410	-0.0008
7	0	7	5.5	6	1	6	4.5	15751.7381	0.0019
7	0	7	6.5	6	1	6	5.5	15756.4846	0.0014
7	0	7	7.5	6	1	6	6.5	15757.4777	-0.0054
6	1	6	6.5	5	0	5	5.5	17319.8553	-0.0024
6	1	6	5.5	5	0	5	4.5	17322.0486	0.0005
6	1	6	7.5	5	0	5	6.5	17328.5754	0.0019
6	1	6	4.5	5	0	5	3.5	17330.7960	-0.0008
2	2	1	2.5	1	1	0	1.5	18134.1394	0.0006

Table 8S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-HC<sup>13</sup>CH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	1	3.5	1	1	0	2.5	18150.8515	0.0023
2	2	0	3.5	1	1	1	2.5	18467.9481	0.0013
2	2	0	2.5	1	1	1	1.5	18476.6789	-0.0011
3	2	2	3.5	2	1	1	2.5	20474.2529	-0.0002
3	2	2	2.5	2	1	1	1.5	20486.2273	-0.0037
3	2	2	4.5	2	1	1	3.5	20490.9905	0.0017

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	1	3	5.5	4	0	4	5.5	6009.2675	-0.0008
4	1	3	3.5	4	0	4	3.5	6018.3379	0.0005
4	1	3	4.5	4	0	4	4.5	6023.2796	-0.0013
2	2	0	2.5	3	1	3	3.5	6148.8667	-0.0013
2	2	0	3.5	3	1	3	4.5	6151.0537	0.0022
2	2	0	1.5	3	1	3	2.5	6151.8765	-0.0004
2	2	0	0.5	3	1	3	1.5	6154.0576	-0.0014
4	0	4	2.5	3	1	3	1.5	6726.6771	0.0001
4	0	4	5.5	3	1	3	4.5	6731.2623	-0.0017
4	0	4	2.5	3	1	3	2.5	6732.5666	-0.0011
4	0	4	4.5	3	1	3	4.5	6736.4150	-0.0017
4	0	4	3.5	3	1	3	2.5	6737.7431	0.0006
4	0	4	3.5	3	1	3	3.5	6740.4897	-0.0010
4	0	4	4.5	3	1	3	3.5	6742.2747	0.0005
1	1	1	1.5	0	0	0	1.5	6788.2217	-0.0007
1	1	1	2.5	0	0	0	1.5	6804.9729	0.0030
1	1	1	0.5	0	0	0	1.5	6818.3884	-0.0020
5	1	4	3.5	5	0	5	3.5	6965.6689	0.0014
5	1	4	6.5	5	0	5	6.5	6970.0901	-0.0007
5	1	4	4.5	5	0	5	4.5	6981.3989	0.0007
5	1	4	5.5	5	0	5	5.5	6985.8746	0.0004
3	1	3	1.5	2	1	2	0.5	7349.0737	0.0016
3	1	3	2.5	2	1	2	1.5	7351.0391	0.0001
3	1	3	4.5	2	1	2	3.5	7351.9541	-0.0004
3	1	3	3.5	2	1	2	2.5	7353.9156	-0.0001
3	0	3	3.5	2	0	2	2.5	7744.8784	-0.0008
3	0	3	4.5	2	0	2	3.5	7746.1515	0.0002
3	0	3	2.5	2	0	2	1.5	7747.4561	-0.0004
3	0	3	1.5	2	0	2	0.5	7748.7257	-0.0009
3	2	2	1.5	2	2	1	0.5	7797.5383	0.0006
3	2	2	4.5	2	2	1	3.5	7803.9014	0.0019
3	2	2	2.5	2	2	1	1.5	7806.4457	-0.0012
3	2	2	3.5	2	2	1	2.5	7812.8116	0.0004
3	2	1	1.5	2	2	0	0.5	7857.0975	0.0008
3	2	1	4.5	2	2	0	3.5	7863.8465	-0.0014
3	2	1	2.5	2	2	0	1.5	7867.2699	-0.0007
3	2	1	3.5	2	2	0	2.5	7874.0217	0.0002
6	1	5	4.5	6	0	6	4.5	8211.1817	0.0000
6	1	5	7.5	6	0	6	7.5	8215.2352	-0.0008
6	1	5	5.5	6	0	6	5.5	8228.4418	0.0009
6	1	5	6.5	6	0	6	6.5	8232.5691	-0.0001
3	1	2	4.5	2	1	1	3.5	8240.3541	0.0004

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
3	1	2	3.5	2	1	1	2.5	8242.3045	0.0006
3	1	2	1.5	2	1	1	0.5	8243.5866	-0.0004
3	1	2	2.5	2	1	1	1.5	8245.5502	-0.0001
4	3	2	4.5	5	2	3	5.5	8285.7065	-0.0024
4	3	2	3.5	5	2	3	4.5	8289.5381	-0.0028
4	3	2	5.5	5	2	3	6.5	8298.6976	0.0040
4	3	2	2.5	5	2	3	3.5	8302.5274	-0.0029
4	3	1	4.5	5	2	4	5.5	8809.2500	-0.0003
4	3	1	3.5	5	2	4	4.5	8811.4118	-0.0023
4	3	1	5.5	5	2	4	6.5	8816.4620	0.0033
4	3	1	2.5	5	2	4	3.5	8818.6941	-0.0023
7	1	6	5.5	6	2	5	4.5	8948.5267	-0.0001
7	1	6	8.5	6	2	5	7.5	8950.7536	-0.0027
7	1	6	6.5	6	2	5	5.5	8960.6536	0.0029
7	1	6	7.5	6	2	5	6.5	8963.0767	0.0023
2	1	2	2.5	1	0	1	1.5	9094.3777	-0.0012
2	1	2	1.5	1	0	1	1.5	9100.0008	-0.0028
2	1	2	2.5	1	0	1	2.5	9103.2906	-0.0009
2	1	2	0.5	1	0	1	1.5	9107.8579	-0.0034
2	1	2	1.5	1	0	1	2.5	9108.9144	-0.0020
2	1	2	3.5	1	0	1	2.5	9111.1141	0.0039
2	1	2	1.5	1	0	1	0.5	9116.0409	-0.0002
2	1	2	0.5	1	0	1	0.5	9123.8980	-0.0007
5	0	5	3.5	4	1	4	2.5	9660.7941	-0.0006
5	0	5	6.5	4	1	4	5.5	9663.6254	-0.0008
5	0	5	3.5	4	1	4	3.5	9666.1626	-0.0014
5	0	5	5.5	4	1	4	5.5	9666.8577	-0.0023
5	0	5	4.5	4	1	4	3.5	9669.4276	0.0005
5	0	5	4.5	4	1	4	4.5	9671.3087	-0.0013
5	0	5	5.5	4	1	4	4.5	9672.2063	0.0009
7	1	6	5.5	7	0	7	5.5	9761.6804	0.0041
7	1	6	8.5	7	0	7	8.5	9765.3282	-0.0019
7	1	6	6.5	7	0	7	6.5	9780.0872	-0.0011
7	1	6	7.5	7	0	7	7.5	9783.9535	-0.0022
4	1	4	2.5	3	1	3	1.5	9785.2179	-0.0008
4	1	4	3.5	3	1	3	2.5	9785.7396	-0.0005
4	1	4	5.5	3	1	3	4.5	9786.0929	-0.0003
4	1	4	4.5	3	1	3	3.5	9786.6053	-0.0001
4	0	4	4.5	3	0	3	3.5	10257.7367	-0.0004
4	0	4	3.5	3	0	3	2.5	10259.1096	-0.0010
4	0	4	5.5	3	0	3	4.5	10259.3754	0.0004
4	0	4	2.5	3	0	3	1.5	10260.7354	-0.0010



Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	2	3	2.5	3	2	2	1.5	10394.0056	0.0007
4	2	3	5.5	3	2	2	4.5	10395.1998	0.0008
4	2	3	3.5	3	2	2	2.5	10397.3869	0.0018
4	2	3	4.5	3	2	2	3.5	10398.5544	0.0003
4	2	2	2.5	3	2	1	1.5	10542.3006	0.0019
4	2	2	5.5	3	2	1	4.5	10543.8110	-0.0001
4	2	2	3.5	3	2	1	2.5	10547.2996	0.0011
4	2	2	4.5	3	2	1	3.5	10548.8096	0.0011
7	2	5	8.5	7	1	6	7.5	10870.6622	0.0030
7	2	5	5.5	7	1	6	6.5	10871.1468	-0.0011
7	2	5	6.5	7	1	6	7.5	10882.8739	-0.0031
7	2	5	7.5	7	1	6	7.5	10886.0004	-0.0010
7	2	5	6.5	7	1	6	6.5	10886.4820	-0.0012
7	2	5	8.5	7	1	6	8.5	10888.3595	0.0021
7	2	5	5.5	7	1	6	5.5	10888.8337	0.0002
7	2	5	7.5	7	1	6	6.5	10889.6092	0.0014
7	2	5	7.5	7	1	6	8.5	10903.6979	-0.0017
7	2	5	6.5	7	1	6	5.5	10904.1695	0.0007
4	1	3	5.5	3	1	2	4.5	10969.0007	0.0009
4	1	3	4.5	3	1	2	3.5	10969.4492	0.0007
4	1	3	2.5	3	1	2	1.5	10971.0067	0.0007
4	1	3	3.5	3	1	2	2.5	10971.4671	0.0014
6	2	4	7.5	6	1	5	6.5	11054.1999	0.0039
6	2	4	4.5	6	1	5	5.5	11055.4722	-0.0017
6	2	4	5.5	6	1	5	6.5	11064.2484	-0.0029
6	2	4	6.5	6	1	5	6.5	11067.3642	-0.0013
6	2	4	5.5	6	1	5	5.5	11068.6295	-0.0015
6	2	4	6.5	6	1	5	5.5	11071.7454	0.0002
6	2	4	7.5	6	1	5	7.5	11072.6992	0.0021
6	2	4	4.5	6	1	5	4.5	11073.9571	-0.0003
6	2	4	6.5	6	1	5	7.5	11085.8640	-0.0026
6	2	4	5.5	6	1	5	4.5	11087.1149	0.0003
3	3	1	3.5	4	2	2	4.5	11112.7877	0.0017
3	3	1	2.5	4	2	2	3.5	11120.3644	-0.0015
3	3	1	4.5	4	2	2	5.5	11130.7955	0.0048
3	3	1	1.5	4	2	2	2.5	11138.3538	-0.0019
3	1	3	3.5	2	0	2	2.5	11260.3422	0.0002
3	1	3	2.5	2	0	2	2.5	11263.0883	-0.0019
3	1	3	3.5	2	0	2	3.5	11268.4048	0.0000
3	1	3	2.5	2	0	2	1.5	11268.8235	-0.0012
3	1	3	2.5	2	0	2	3.5	11271.1507	-0.0023
3	1	3	4.5	2	0	2	3.5	11274.2658	0.0034

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
3	1	3	1.5	2	0	2	1.5	11274.7144	-0.0010
3	1	3	1.5	2	0	2	0.5	11282.7867	0.0006
3	3	0	3.5	4	2	3	4.5	11340.5248	0.0026
3	3	0	2.5	4	2	3	3.5	11346.7539	-0.0008
3	3	0	4.5	4	2	3	5.5	11354.7458	0.0054
3	3	0	1.5	4	2	3	2.5	11360.9926	-0.0033
5	2	3	6.5	5	1	4	5.5	11386.2007	0.0035
5	2	3	3.5	5	1	4	4.5	11388.6203	-0.0013
5	2	3	4.5	5	1	4	5.5	11393.7350	-0.0033
5	2	3	5.5	5	1	4	5.5	11396.7019	-0.0019
5	2	3	4.5	5	1	4	4.5	11399.1078	-0.0020
5	2	3	5.5	5	1	4	4.5	11402.0756	0.0003
5	2	3	6.5	5	1	4	6.5	11405.2169	0.0023
5	2	3	5.5	5	1	4	6.5	11415.7194	-0.0018
5	2	3	4.5	5	1	4	3.5	11418.1039	0.0004
4	2	2	5.5	4	1	3	4.5	11799.0171	0.0041
4	2	2	2.5	4	1	3	3.5	11803.2641	-0.0011
4	2	2	3.5	4	1	3	4.5	11803.6363	-0.0027
4	2	2	4.5	4	1	3	4.5	11806.1417	-0.0012
4	2	2	3.5	4	1	3	3.5	11810.3639	-0.0020
4	2	2	4.5	4	1	3	3.5	11812.8701	0.0002
4	2	2	5.5	4	1	3	5.5	11818.1816	0.0034
4	2	2	2.5	4	1	3	2.5	11822.4129	0.0000
4	2	2	4.5	4	1	3	5.5	11825.3065	-0.0016
4	2	2	3.5	4	1	3	2.5	11829.5138	0.0003
5	1	5	4.5	4	1	4	3.5	12206.6388	0.0020
5	1	5	6.5	4	1	4	5.5	12207.0104	-0.0038
3	2	1	4.5	3	1	2	3.5	12224.6558	0.0054
3	2	1	2.5	3	1	2	3.5	12225.7871	-0.0019
3	2	1	3.5	3	1	2	3.5	12226.7826	-0.0003
3	2	1	1.5	3	1	2	2.5	12232.4307	-0.0014
3	2	1	2.5	3	1	2	2.5	12234.5323	-0.0009
3	2	1	3.5	3	1	2	2.5	12235.5277	0.0007
3	2	1	4.5	3	1	2	4.5	12243.3721	0.0052
3	2	1	3.5	3	1	2	4.5	12245.4986	-0.0008
3	2	1	1.5	3	1	2	1.5	12251.1205	0.0004
3	2	1	2.5	3	1	2	1.5	12253.2219	0.0007
6	0	6	4.5	5	1	5	3.5	12574.6725	0.0005
6	0	6	7.5	5	1	5	6.5	12576.5142	-0.0003
6	0	6	6.5	5	1	5	6.5	12577.6818	-0.0006
6	0	6	4.5	5	1	5	4.5	12580.0460	-0.0006
6	0	6	5.5	5	1	5	4.5	12581.2720	0.0011

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
6	0	6	5.5	5	1	5	5.5	12582.7824	-0.0059
6	0	6	6.5	5	1	5	5.5	12583.0408	0.0011
2	2	0	2.5	2	1	1	2.5	12595.0649	-0.0005
2	2	0	1.5	2	1	1	2.5	12600.8194	-0.0029
2	2	0	3.5	2	1	1	2.5	12603.1125	0.0061
2	2	0	2.5	2	1	1	1.5	12607.0566	0.0007
2	2	0	2.5	2	1	1	3.5	12611.8314	-0.0002
2	2	0	1.5	2	1	1	1.5	12612.8112	-0.0017
2	2	0	3.5	2	1	1	3.5	12619.8783	0.0057
2	2	0	0.5	2	1	1	1.5	12620.8839	-0.0019
2	2	0	1.5	2	1	1	0.5	12629.5365	-0.0011
2	2	0	0.5	2	1	1	0.5	12637.6090	-0.0014
5	0	5	5.5	4	0	4	4.5	12716.5363	-0.0003
5	0	5	4.5	4	0	4	3.5	12717.4246	-0.0001
5	0	5	6.5	4	0	4	5.5	12718.4561	0.0007
5	0	5	3.5	4	0	4	2.5	12719.3357	-0.0007
5	2	4	3.5	4	2	3	2.5	12975.1745	0.0000
5	2	4	6.5	4	2	3	5.5	12975.3786	0.0001
5	2	4	4.5	4	2	3	3.5	12976.6697	0.0007
5	2	4	5.5	4	2	3	4.5	12976.8310	0.0000
5	2	3	3.5	4	2	2	2.5	13265.8421	0.0004
5	2	3	6.5	4	2	2	5.5	13266.3149	0.0007
5	2	3	4.5	4	2	2	3.5	13269.2309	0.0016
5	2	3	5.5	4	2	2	4.5	13269.6910	0.0002
4	1	4	4.5	3	0	3	3.5	13302.0687	0.0005
4	1	4	3.5	3	0	3	3.5	13303.9501	-0.0010
4	1	4	3.5	3	0	3	2.5	13307.1083	0.0001
4	1	4	4.5	3	0	3	4.5	13308.8593	0.0005
4	1	4	2.5	3	0	3	2.5	13312.4794	0.0018
4	1	4	5.5	3	0	3	4.5	13314.2076	0.0034
4	1	4	2.5	3	0	3	1.5	13319.2800	0.0018
2	2	1	2.5	2	1	2	3.5	13479.1877	-0.0045
2	2	1	1.5	2	1	2	0.5	13479.8950	-0.0005
2	2	1	2.5	2	1	2	1.5	13481.3873	0.0012
2	2	1	2.5	2	1	2	2.5	13487.0111	0.0002
2	2	1	1.5	2	1	2	1.5	13487.7517	-0.0014
2	2	1	3.5	2	1	2	3.5	13488.0972	0.0022
2	2	1	0.5	2	1	2	0.5	13488.8115	-0.0007
2	2	1	1.5	2	1	2	2.5	13493.3757	-0.0022
2	2	1	3.5	2	1	2	2.5	13495.9209	0.0072
2	2	1	0.5	2	1	2	1.5	13496.6685	-0.0013
5	1	4	5.5	4	1	3	4.5	13679.1306	0.0007

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
5	1	4	6.5	4	1	3	5.5	13679.2788	0.0009
5	1	4	4.5	4	1	3	3.5	13680.4872	0.0018
5	1	4	3.5	4	1	3	2.5	13680.6392	-0.0001
3	2	2	1.5	3	1	3	1.5	13937.2806	0.0027
3	2	2	4.5	3	1	3	4.5	13940.0418	0.0018
3	2	2	2.5	3	1	3	2.5	13943.1604	-0.0006
3	2	2	3.5	3	1	3	3.5	13945.9064	0.0000
4	2	3	2.5	4	1	4	2.5	14546.0658	0.0018
4	2	3	5.5	4	1	4	5.5	14549.1481	0.0024
4	2	3	3.5	4	1	4	2.5	14549.4368	0.0002
4	2	3	2.5	4	1	4	3.5	14551.4331	-0.0003
4	2	3	4.5	4	1	4	5.5	14552.5068	-0.0030
4	2	3	5.5	4	1	4	4.5	14554.4965	0.0054
4	2	3	3.5	4	1	4	3.5	14554.8057	-0.0003
4	2	3	4.5	4	1	4	3.5	14555.9736	0.0012
4	2	3	3.5	4	1	4	4.5	14556.6867	-0.0021
4	2	3	4.5	4	1	4	4.5	14557.8542	-0.0010
6	1	6	5.5	5	1	5	4.5	14612.7339	0.0001
6	1	6	6.5	5	1	5	5.5	14612.9185	0.0022
6	1	6	4.5	5	1	5	3.5	14612.9793	-0.0054
6	1	6	7.5	5	1	5	6.5	14613.1791	0.0019
6	0	6	6.5	5	0	5	5.5	15117.8371	0.0005
6	0	6	5.5	5	0	5	4.5	15118.4810	0.0003
6	0	6	7.5	5	0	5	6.5	15119.9029	0.0004
6	0	6	4.5	5	0	5	3.5	15120.5190	-0.0004
5	1	5	5.5	4	0	4	4.5	15251.3335	0.0000
5	1	5	4.5	4	0	4	4.5	15252.8498	-0.0010
5	1	5	4.5	4	0	4	3.5	15254.6342	-0.0001
5	1	5	5.5	4	0	4	5.5	15256.4859	-0.0003
5	1	5	3.5	4	0	4	3.5	15260.0092	0.0003
5	1	5	6.5	4	0	4	5.5	15261.8468	0.0033
5	1	5	3.5	4	0	4	2.5	15265.1845	0.0007
5	2	4	3.5	5	1	5	3.5	15314.5993	0.0027
5	2	4	6.5	5	1	5	6.5	15317.5111	0.0012
5	2	4	4.5	5	1	5	4.5	15324.8382	0.0000
5	2	4	5.5	5	1	5	5.5	15327.6818	-0.0021
7	0	7	5.5	6	1	6	4.5	15430.8901	0.0003
7	0	7	7.5	6	1	6	7.5	15431.2415	-0.0027
7	0	7	8.5	6	1	6	7.5	15432.1712	-0.0004
7	0	7	6.5	6	1	6	5.5	15435.7894	0.0007
7	0	7	5.5	6	1	6	5.5	15436.5126	-0.0026
7	0	7	7.5	6	1	6	6.5	15436.8634	0.0009

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
7	0	7	6.5	6	1	6	6.5	15437.1227	-0.0009
6	2	5	7.5	5	2	4	6.5	15542.4156	0.0029
6	2	5	6.5	5	2	4	5.5	15542.9772	0.0010
6	2	5	5.5	5	2	4	4.5	15543.1234	0.0015
6	2	4	4.5	5	2	3	3.5	16032.3753	-0.0003
6	2	4	7.5	5	2	3	6.5	16032.5311	0.0008
6	2	4	5.5	5	2	3	4.5	16035.0451	0.0007
6	2	4	6.5	5	2	3	5.5	16035.1955	0.0023
6	2	5	4.5	6	1	6	4.5	16244.0392	-0.0002
6	2	5	7.5	6	1	6	7.5	16246.7464	0.0010
6	2	5	5.5	6	1	6	5.5	16255.2263	0.0000
6	2	5	6.5	6	1	6	6.5	16257.7424	-0.0015
6	1	5	6.5	5	1	4	5.5	16364.5320	0.0005
6	1	5	7.5	5	1	4	6.5	16365.0497	0.0019
6	1	5	5.5	5	1	4	4.5	16365.5234	0.0001
6	1	5	4.5	5	1	4	3.5	16366.0326	-0.0009
7	1	7	6.5	6	1	6	5.5	17003.3844	0.0012
7	1	7	7.5	6	1	6	6.5	17003.4976	0.0012
7	1	7	5.5	6	1	6	4.5	17003.7827	0.0022
7	1	7	8.5	6	1	6	7.5	17003.8780	0.0007
6	1	6	6.5	5	0	5	5.5	17147.7127	-0.0004
6	1	6	5.5	5	0	5	5.5	17149.0457	-0.0024
6	1	6	5.5	5	0	5	4.5	17149.9433	-0.0002
6	1	6	6.5	5	0	5	6.5	17150.9444	-0.0026
6	1	6	4.5	5	0	5	4.5	17155.5680	-0.0009
6	1	6	7.5	5	0	5	6.5	17156.5676	0.0023
6	1	6	4.5	5	0	5	3.5	17158.8321	0.0001
7	2	6	5.5	7	1	7	5.5	17334.3287	0.0010
7	2	6	8.5	7	1	7	8.5	17336.6196	0.0009
7	2	6	6.5	7	1	7	6.5	17345.8443	-0.0026
7	2	6	7.5	7	1	7	7.5	17348.3196	-0.0017
7	0	7	7.5	6	0	6	6.5	17466.7395	0.0005
7	0	7	6.5	6	0	6	5.5	17467.2521	0.0005
7	0	7	8.5	6	0	6	7.5	17468.8348	0.0004
7	0	7	5.5	6	0	6	4.5	17469.2033	0.0009
2	2	1	2.5	1	1	0	1.5	18086.2184	0.0013
2	2	1	1.5	1	1	0	1.5	18092.5835	-0.0007
2	2	1	2.5	1	1	0	2.5	18094.0453	-0.0007
2	2	1	1.5	1	1	0	2.5	18100.4102	-0.0028
2	2	1	0.5	1	1	0	1.5	18101.4988	-0.0021
2	2	1	3.5	1	1	0	2.5	18102.9543	0.0054
2	2	1	1.5	1	1	0	0.5	18106.7164	-0.0012

Table 9S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
2	2	1	0.5	1	1	0	0.5	18115.6331	-0.0013
8	0	8	6.5	7	1	7	5.5	18205.4740	-0.0009
8	0	8	9.5	7	1	7	8.5	18206.1154	-0.0006
8	0	8	7.5	7	1	7	6.5	18208.6857	-0.0001
8	0	8	8.5	7	1	7	7.5	18209.4999	-0.0002
2	2	0	1.5	1	1	1	0.5	18393.9508	-0.0019
2	2	0	2.5	1	1	1	2.5	18401.6130	-0.0033
2	2	0	0.5	1	1	1	0.5	18402.0234	-0.0022
2	2	0	1.5	1	1	1	2.5	18407.3676	-0.0056
2	2	0	3.5	1	1	1	2.5	18409.6603	0.0030
2	2	0	2.5	1	1	1	1.5	18418.3658	0.0022
2	2	0	1.5	1	1	1	1.5	18424.1201	-0.0005
2	2	0	0.5	1	1	1	1.5	18432.1924	-0.0011
7	1	6	7.5	6	1	5	6.5	19018.1245	-0.0011
7	1	6	6.5	6	1	5	5.5	19018.8976	-0.0014
7	1	6	8.5	6	1	5	7.5	19018.9287	0.0002
7	1	6	5.5	6	1	5	4.5	19019.6937	-0.0034
7	1	7	7.5	6	0	6	6.5	19033.3732	0.0003
7	1	7	7.5	6	0	6	7.5	19034.5408	0.0000
7	1	7	6.5	6	0	6	6.5	19034.5915	-0.0032
7	1	7	6.5	6	0	6	5.5	19034.8458	-0.0003
7	1	7	8.5	6	0	6	7.5	19040.5418	0.0017
7	1	7	5.5	6	0	6	5.5	19040.8685	-0.0003
7	1	7	5.5	6	0	6	4.5	19042.0940	0.0009
3	2	2	3.5	2	1	1	2.5	20392.1025	-0.0013
3	2	2	2.5	2	1	1	1.5	20404.0939	-0.0032
3	2	2	4.5	2	1	1	3.5	20408.8666	0.0055
3	2	2	1.5	2	1	1	0.5	20420.8279	-0.0013

Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	1	3	2.5	4	0	4	2.5	5911.1524	-0.0005
4	1	3	5.5	4	0	4	5.5	5915.0331	-0.0008
4	1	3	3.5	4	0	4	3.5	5922.2180	0.0013
4	1	3	4.5	4	0	4	4.5	5926.1198	-0.0007
1	1	1	1.5	0	0	0	1.5	6662.0678	-0.0010
1	1	1	2.5	0	0	0	1.5	6675.2314	0.0027
1	1	1	0.5	0	0	0	1.5	6685.7696	-0.0016
4	0	4	2.5	3	1	3	1.5	6741.7059	0.0004
4	0	4	5.5	3	1	3	4.5	6745.2814	-0.0011
4	0	4	2.5	3	1	3	2.5	6746.3609	-0.0006
4	0	4	4.5	3	1	3	4.5	6749.2265	-0.0012
4	0	4	3.5	3	1	3	2.5	6750.3200	0.0003
4	0	4	3.5	3	1	3	3.5	6752.4915	-0.0006
4	0	4	4.5	3	1	3	3.5	6753.8636	0.0004
5	1	4	3.5	5	0	5	3.5	6881.4421	-0.0003
5	1	4	6.5	5	0	5	6.5	6884.9476	-0.0008
5	1	4	4.5	5	0	5	4.5	6893.9045	-0.0003
5	1	4	5.5	5	0	5	5.5	6897.4442	-0.0007
3	1	3	2.5	2	1	2	1.5	7282.4419	0.0016
3	1	3	4.5	2	1	2	3.5	7283.1640	-0.0024
3	1	3	3.5	2	1	2	2.5	7284.6972	-0.0009
3	0	3	3.5	2	0	2	2.5	7676.1979	-0.0008
3	0	3	4.5	2	0	2	3.5	7677.2271	0.0008
3	0	3	2.5	2	0	2	1.5	7678.2277	-0.0011
3	0	3	1.5	2	0	2	0.5	7679.2534	-0.0017
4	3	2	4.5	5	2	3	5.5	7855.1927	-0.0029
4	3	2	3.5	5	2	3	4.5	7858.2237	-0.0032
4	3	2	5.5	5	2	3	6.5	7865.4770	0.0031
4	3	2	2.5	5	2	3	3.5	7868.5052	-0.0025
3	1	2	4.5	2	1	1	3.5	8174.8970	0.0005
3	1	2	3.5	2	1	1	2.5	8176.4171	0.0000
3	1	2	2.5	2	1	1	1.5	8178.9703	-0.0019
4	3	1	4.5	5	2	4	5.5	8394.0963	-0.0012
4	3	1	3.5	5	2	4	4.5	8395.7839	-0.0014
4	3	1	5.5	5	2	4	6.5	8399.7171	0.0023
4	3	1	2.5	5	2	4	3.5	8401.4548	-0.0003
2	1	2	2.5	1	0	1	1.5	8944.7024	-0.0011
2	1	2	1.5	1	0	1	1.5	8949.1314	-0.0022
2	1	2	2.5	1	0	1	2.5	8951.6854	-0.0010
2	1	2	0.5	1	0	1	1.5	8955.3219	-0.0030
2	1	2	1.5	1	0	1	2.5	8956.1148	-0.0017
2	1	2	3.5	1	0	1	2.5	8957.8565	0.0030

Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	1	2	1.5	1	0	1	0.5	8961.6993	-0.0003
2	1	2	0.5	1	0	1	0.5	8967.8900	-0.0009
5	0	5	3.5	4	1	4	2.5	9647.2224	-0.0002
5	0	5	6.5	4	1	4	5.5	9649.4156	-0.0008
5	0	5	3.5	4	1	4	3.5	9651.4785	-0.0011
5	0	5	5.5	4	1	4	5.5	9651.8202	0.0014
5	0	5	4.5	4	1	4	3.5	9653.9017	0.0005
5	0	5	4.5	4	1	4	4.5	9655.3931	-0.0010
5	0	5	5.5	4	1	4	4.5	9656.0617	0.0006
4	1	4	2.5	3	1	3	1.5	9693.1164	0.0006
4	1	4	3.5	3	1	3	2.5	9693.5143	-0.0005
4	1	4	5.5	3	1	3	4.5	9693.8020	0.0010
4	1	4	4.5	3	1	3	3.5	9694.1961	0.0019
4	0	4	4.5	3	0	3	3.5	10163.9923	0.0001
4	0	4	3.5	3	0	3	2.5	10165.0714	-0.0002
4	0	4	5.5	3	0	3	4.5	10165.3143	0.0004
4	0	4	2.5	3	0	3	1.5	10166.3855	-0.0010
4	2	3	2.5	3	2	2	1.5	10304.8048	0.0031
4	2	3	5.5	3	2	2	4.5	10305.7335	-0.0001
4	2	3	3.5	3	2	2	2.5	10307.4425	-0.0005
4	2	3	4.5	3	2	2	3.5	10308.3590	0.0004
4	2	2	2.5	3	2	1	1.5	10457.9532	0.0008
4	2	2	5.5	3	2	1	4.5	10459.1413	-0.0002
4	2	2	3.5	3	2	1	2.5	10461.9021	-0.0003
4	2	2	4.5	3	2	1	3.5	10463.0909	-0.0005
7	2	5	7.5	7	1	6	7.5	10611.1390	0.0008
7	2	5	6.5	7	1	6	6.5	10611.4728	-0.0017
7	2	5	8.5	7	1	6	8.5	10612.7822	0.0012
7	2	5	5.5	7	1	6	5.5	10613.1137	0.0008
3	3	1	3.5	4	2	2	4.5	10667.5874	0.0015
3	3	1	2.5	4	2	2	3.5	10673.5515	-0.0003
3	3	1	4.5	4	2	2	5.5	10681.7767	0.0035
3	3	1	1.5	4	2	2	2.5	10687.7270	-0.0027
6	2	4	6.5	6	1	5	6.5	10773.2400	-0.0008
6	2	4	5.5	6	1	5	5.5	10774.1910	-0.0016
6	2	4	7.5	6	1	5	7.5	10777.2541	0.0014
6	2	4	4.5	6	1	5	4.5	10778.2005	-0.0005
4	1	3	5.5	3	1	2	4.5	10880.8394	0.0016
4	1	3	4.5	3	1	2	3.5	10881.1784	0.0013
4	1	3	2.5	3	1	2	1.5	10882.4191	0.0018
4	1	3	3.5	3	1	2	2.5	10882.7667	0.0019
3	3	0	3.5	4	2	3	4.5	10901.9781	0.0039



Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
3	3	0	2.5	4	2	3	3.5	10906.8540	0.0001
5	2	3	6.5	5	1	4	5.5	11081.4751	0.0026
5	2	3	3.5	5	1	4	4.5	11083.3328	-0.0017
3	1	3	3.5	2	0	2	2.5	11086.3274	-0.0004
5	2	3	4.5	5	1	4	5.5	11087.4649	-0.0012
3	1	3	2.5	2	0	2	2.5	11088.4979	-0.0022
5	2	3	4.5	5	1	4	4.5	11091.6709	-0.0024
3	1	3	3.5	2	0	2	3.5	11092.6215	-0.0008
3	1	3	2.5	2	0	2	1.5	11092.9795	-0.0012
3	1	3	1.5	2	0	2	2.5	11093.1535	-0.0026
5	2	3	5.5	5	1	4	4.5	11094.0284	-0.0014
3	1	3	2.5	2	0	2	3.5	11094.7929	-0.0018
5	2	3	6.5	5	1	4	6.5	11096.3735	0.0021
3	1	3	4.5	2	0	2	3.5	11097.2610	0.0033
3	1	3	1.5	2	0	2	1.5	11097.6353	-0.0013
5	2	3	3.5	5	1	4	3.5	11098.2173	-0.0012
3	1	3	1.5	2	0	2	0.5	11103.9376	0.0015
5	2	3	5.5	5	1	4	6.5	11104.7186	-0.0030
5	2	3	4.5	5	1	4	3.5	11106.5563	-0.0009
4	2	2	5.5	4	1	3	4.5	11486.5828	0.0037
4	2	2	3.5	4	1	3	3.5	11495.5332	-0.0015
4	2	2	4.5	4	1	3	3.5	11497.5262	0.0002
4	2	2	5.5	4	1	3	5.5	11501.6136	0.0026
4	2	2	2.5	4	1	3	2.5	11504.9034	0.0004
4	2	2	4.5	4	1	3	5.5	11507.2820	-0.0009
4	2	2	3.5	4	1	3	2.5	11510.5561	-0.0007
3	2	1	4.5	3	1	2	3.5	11908.6188	0.0041
3	2	1	2.5	3	1	2	3.5	11909.5327	-0.0018
3	2	1	3.5	3	1	2	3.5	11910.3364	-0.0004
3	2	1	1.5	3	1	2	2.5	11914.6920	-0.0014
3	2	1	2.5	3	1	2	2.5	11916.3966	-0.0006
3	2	1	3.5	3	1	2	2.5	11917.1998	0.0003
3	2	1	4.5	3	1	2	4.5	11923.3113	0.0041
3	2	1	3.5	3	1	2	4.5	11925.0287	-0.0006
3	2	1	1.5	3	1	2	1.5	11929.3677	-0.0002
3	2	1	2.5	3	1	2	1.5	11931.0716	-0.0002
5	1	5	4.5	4	1	4	3.5	12090.6058	0.0034
5	1	5	5.5	4	1	4	4.5	12090.8890	-0.0004
5	1	5	6.5	4	1	4	5.5	12090.9078	-0.0007
2	2	0	2.5	2	1	1	2.5	12279.3609	-0.0008
2	2	0	1.5	2	1	1	2.5	12283.8530	-0.0023
2	2	0	3.5	2	1	1	2.5	12285.6482	0.0046

Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
2	2	0	2.5	2	1	1	1.5	12288.7797	0.0003
2	2	0	2.5	2	1	1	3.5	12292.5333	-0.0002
2	2	0	1.5	2	1	1	1.5	12293.2716	-0.0014
2	2	0	3.5	2	1	1	3.5	12298.8200	0.0045
2	2	0	0.5	2	1	1	1.5	12299.5718	-0.0020
2	2	0	1.5	2	1	1	0.5	12306.4177	-0.0010
2	2	0	0.5	2	1	1	0.5	12312.7182	-0.0013
6	0	6	4.5	5	1	5	3.5	12529.1118	0.0001
6	0	6	7.5	5	1	5	6.5	12530.5275	-0.0002
6	0	6	6.5	5	1	5	6.5	12531.2782	-0.0004
6	0	6	4.5	5	1	5	4.5	12533.3831	-0.0002
6	0	6	5.5	5	1	5	4.5	12534.1734	0.0006
6	0	6	5.5	5	1	5	5.5	12535.3793	0.0004
6	0	6	6.5	5	1	5	5.5	12535.5405	0.0005
5	0	5	5.5	4	0	4	4.5	12596.3915	-0.0007
5	0	5	4.5	4	0	4	3.5	12597.0957	-0.0006
5	0	5	6.5	4	0	4	5.5	12597.9367	0.0018
5	0	5	3.5	4	0	4	2.5	12598.6348	0.0019
5	2	4	3.5	4	2	3	2.5	12862.6045	0.0001
5	2	4	6.5	4	2	3	5.5	12862.7611	-0.0001
5	2	4	4.5	4	2	3	3.5	12863.7658	-0.0005
5	2	4	5.5	4	2	3	4.5	12863.8927	0.0006
4	1	4	4.5	3	0	3	3.5	13104.3245	0.0013
4	1	4	3.5	3	0	3	3.5	13105.8157	-0.0005
4	1	4	3.5	3	0	3	2.5	13108.2667	0.0001
4	1	4	4.5	3	0	3	4.5	13109.5907	0.0005
4	1	4	2.5	3	0	3	2.5	13112.5260	0.0024
4	1	4	5.5	3	0	3	4.5	13113.8357	0.0032
4	1	4	2.5	3	0	3	1.5	13117.7986	0.0018
5	2	3	3.5	4	2	2	2.5	13162.2379	0.0000
5	2	3	6.5	4	2	2	5.5	13162.6103	0.0004
2	2	1	2.5	2	1	2	3.5	13164.1317	-0.0026
2	2	1	1.5	2	1	2	0.5	13164.6680	-0.0005
5	2	3	4.5	4	2	2	3.5	13164.9248	0.0019
5	2	3	5.5	4	2	2	4.5	13165.2884	0.0003
2	2	1	2.5	2	1	2	1.5	13165.8725	0.0012
2	2	1	2.5	2	1	2	2.5	13170.3019	0.0004
2	2	1	1.5	2	1	2	1.5	13170.8588	-0.0010
2	2	1	3.5	2	1	2	3.5	13171.1129	0.0017
2	2	1	0.5	2	1	2	0.5	13171.6542	0.0003
2	2	1	1.5	2	1	2	2.5	13175.2886	-0.0014
2	2	1	3.5	2	1	2	2.5	13177.2842	0.0060

Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
2	2	1	0.5	2	1	2	1.5	13177.8442	-0.0010
5	1	4	5.5	4	1	3	4.5	13567.7167	0.0002
5	1	4	6.5	4	1	3	5.5	13567.8500	0.0005
5	1	4	3.5	4	1	3	2.5	13568.9219	-0.0005
3	2	2	1.5	3	1	3	1.5	13623.1941	0.0017
3	2	2	4.5	3	1	3	4.5	13625.3747	0.0012
3	2	2	2.5	3	1	3	2.5	13627.8453	0.0012
3	2	2	3.5	3	1	3	3.5	13630.0151	0.0008
4	2	3	2.5	4	1	4	2.5	14234.8796	0.0013
4	2	3	5.5	4	1	4	5.5	14237.3070	0.0008
4	2	3	3.5	4	1	4	3.5	14241.7728	0.0004
4	2	3	4.5	4	1	4	4.5	14244.1774	-0.0013
5	2	4	3.5	5	1	5	3.5	15006.8668	0.0013
5	2	4	6.5	5	1	5	6.5	15009.1592	0.0003
5	2	4	4.5	5	1	5	4.5	15014.9353	-0.0010
5	2	4	5.5	5	1	5	5.5	15017.1812	-0.0002
5	1	5	5.5	4	0	4	4.5	15031.2209	0.0004
5	1	5	4.5	4	0	4	4.5	15032.4252	-0.0012
5	1	5	4.5	4	0	4	3.5	15033.7975	-0.0001
5	1	5	5.5	4	0	4	5.5	15035.1649	-0.0009
5	1	5	3.5	4	0	4	3.5	15038.0690	-0.0001
5	1	5	6.5	4	0	4	5.5	15039.4289	0.0019
5	1	5	3.5	4	0	4	2.5	15042.0287	0.0013
7	0	7	5.5	6	1	6	4.5	15350.1400	-0.0004
7	0	7	8.5	6	1	6	7.5	15351.1290	-0.0002
7	0	7	6.5	6	1	6	5.5	15353.8694	0.0001
7	0	7	7.5	6	1	6	6.5	15354.6857	0.0004
6	2	5	7.5	5	2	4	6.5	15406.3165	-0.0014
6	2	5	6.5	5	2	4	5.5	15406.7397	-0.0018
6	2	5	5.5	5	2	4	4.5	15406.8668	-0.0014
6	2	4	7.5	5	2	3	6.5	15910.3604	-0.0004
6	2	4	6.5	5	2	3	5.5	15912.4692	-0.0015
6	2	5	4.5	6	1	6	4.5	15940.4047	0.0009
6	2	5	7.5	6	1	6	7.5	15942.5448	0.0041
6	2	5	5.5	6	1	6	5.5	15949.2239	-0.0025
6	2	5	6.5	6	1	6	6.5	15951.2014	-0.0007
6	1	6	6.5	5	0	5	5.5	16907.5485	-0.0006
6	1	6	5.5	5	0	5	4.5	16909.2793	-0.0002
6	1	6	7.5	5	0	5	6.5	16914.4302	0.0020
6	1	6	4.5	5	0	5	3.5	16916.1777	-0.0015
2	2	1	2.5	1	1	0	1.5	17725.2532	0.0011
2	2	1	1.5	1	1	0	1.5	17730.2392	-0.0014

Table 10S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-H<sup>13</sup>C<sup>13</sup>CH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$F'$	$J''$	$K_a''$	$K_c''$	$F''$	Observed	Obs - Calc
2	2	1	2.5	1	1	0	2.5	17731.4248	-0.0007
2	2	1	1.5	1	1	0	2.5	17736.4114	-0.0027
2	2	1	0.5	1	1	0	1.5	17737.2231	-0.0029
2	2	1	3.5	1	1	0	2.5	17738.4064	0.0041
2	2	1	1.5	1	1	0	0.5	17741.3778	-0.0010
2	2	1	0.5	1	1	0	0.5	17748.3628	-0.0013
2	2	0	1.5	1	1	1	0.5	18035.4155	-0.0011
2	2	0	2.5	1	1	1	2.5	18041.4634	-0.0020
2	2	0	0.5	1	1	1	0.5	18041.7155	-0.0019
2	2	0	1.5	1	1	1	2.5	18045.9542	-0.0048
2	2	0	3.5	1	1	1	2.5	18047.7497	0.0024
2	2	0	2.5	1	1	1	1.5	18054.6270	0.0017
2	2	0	1.5	1	1	1	1.5	18059.1185	-0.0004
2	2	0	0.5	1	1	1	1.5	18065.4200	0.0002
8	0	8	6.5	7	1	7	5.5	18087.3494	-0.0007
8	0	8	9.5	7	1	7	8.5	18087.8617	-0.0010
8	0	8	7.5	7	1	7	6.5	18089.7805	-0.0006
8	0	8	8.5	7	1	7	7.5	18090.3798	-0.0003
7	1	7	7.5	6	0	6	6.5	18776.0962	0.0002
7	1	7	6.5	6	0	6	5.5	18777.2316	-0.0002
7	1	7	8.5	6	0	6	7.5	18781.6342	0.0018
7	1	7	5.5	6	0	6	4.5	18782.8212	0.0002
3	2	2	3.5	2	1	1	2.5	20007.6231	-0.0019
3	2	2	2.5	2	1	1	1.5	20017.0428	-0.0019
3	2	2	4.5	2	1	1	3.5	20020.7957	0.0043
3	2	2	1.5	2	1	1	0.5	20030.1932	-0.0015

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
1	1	1	1	1.5	1.5	0	0	0	1	1.5	1.5	6770.0311	-0.0001
1	1	1	1	1.5	2.5	0	0	0	1	1.5	2.5	6770.0485	-0.0002
1	1	1	1	1.5	0.5	0	0	0	1	1.5	0.5	6770.0645	0.0019
1	1	1	1	1.5	0.5	0	0	0	1	1.5	1.5		
1	1	1	1	2.5	1.5	0	0	0	1	1.5	0.5	6786.8608	0.0018
1	1	1	1	2.5	3.5	0	0	0	1	1.5	2.5	6786.8699	0.0030
1	1	1	1	2.5	2.5	0	0	0	1	1.5	1.5	6786.8872	0.0020
1	1	1	0	0.5	0.5	0	0	0	0	1.5	1.5	6800.3518	-0.0020
4	0	4	1	2.5	2.5	3	1	3	1	1.5	1.5	7202.7237	-0.0013
4	0	4	1	2.5	3.5	3	1	3	1	1.5	2.5	7202.7344	-0.0003
4	0	4	1	2.5	1.5	3	1	3	1	1.5	0.5	7202.7458	-0.0004
4	0	4	1	5.5	5.5	3	1	3	1	4.5	4.5	7207.2092	-0.0008
4	0	4	1	5.5	6.5	3	1	3	1	4.5	5.5	7207.2260	-0.0022
4	0	4	1	5.5	4.5	3	1	3	1	4.5	3.5	7207.2345	0.0017
4	0	4	1	3.5	3.5	3	1	3	1	2.5	2.5	7213.4968	-0.0004
4	0	4	1	3.5	4.5	3	1	3	1	2.5	3.5	7213.5047	0.0002
4	0	4	1	3.5	2.5	3	1	3	1	2.5	1.5	7213.5105	0.0016
4	0	4	1	4.5	4.5	3	1	3	1	3.5	3.5	7217.9326	0.0022
4	0	4	1	4.5	5.5	3	1	3	1	3.5	4.5	7217.9408	-0.0008
4	0	4	1	4.5	3.5	3	1	3	1	3.5	2.5	7217.9479	0.0022
2	1	2	1	2.5	1.5	1	0	1	1	1.5	0.5	9141.3491	-0.0016
2	1	2	1	2.5	3.5	1	0	1	1	1.5	2.5	9141.3567	0.0003
2	1	2	1	2.5	2.5	1	0	1	1	1.5	1.5	9141.3698	0.0015
2	1	2	0	1.5	1.5	1	0	1	0	1.5	1.5	9146.9846	-0.0007
2	1	2	0	0.5	0.5	1	0	1	0	1.5	1.5	9154.8447	-0.0009
2	1	2	1	2.5	3.5	1	0	1	1	2.5	3.5	9150.3444	-0.0012
2	1	2	1	2.5	2.5	1	0	1	1	2.5	2.5	9150.3557	0.0015
2	1	2	0	1.5	1.5	1	0	1	0	2.5	2.5	9155.9722	-0.0016
2	1	2	1	3.5	2.5	1	0	1	1	2.5	1.5	9158.1569	0.0008
2	1	2	1	3.5	4.5	1	0	1	1	2.5	3.5	9158.1669	0.0039
2	1	2	1	3.5	3.5	1	0	1	1	2.5	2.5	9158.1899	0.0023
2	1	2	0	1.5	1.5	1	0	1	0	0.5	0.5	9163.1583	-0.0006
2	1	2	0	0.5	0.5	1	0	1	0	0.5	0.5	9171.0185	-0.0007
5	0	5	1	3.5	3.5	4	1	4	1	2.5	2.5	10224.2452	0.0002
5	0	5	1	3.5	4.5	4	1	4	1	2.5	3.5	10224.2568	0.0001
5	0	5	1	3.5	2.5	4	1	4	1	2.5	1.5	10224.2653	0.0015
5	0	5	1	6.5	6.5	4	1	4	1	5.5	5.5	10226.9608	-0.0008
5	0	5	1	6.5	7.5	4	1	4	1	5.5	6.5	10226.9770	-0.0019
5	0	5	1	6.5	5.5	4	1	4	1	5.5	4.5		
5	0	5	1	4.5	4.5	4	1	4	1	3.5	3.5	10232.4588	-0.0010
5	0	5	1	4.5	5.5	4	1	4	1	3.5	4.5	10232.4708	0.0010
5	0	5	1	4.5	3.5	4	1	4	1	3.5	2.5	10232.4754	0.0016

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>s'</i>	<i>F<sub>1</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>s''</i>	<i>F<sub>1</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
5	0	5	1	5.5	5.5	4	1	4	1	4.5	4.5	10235.1182	-0.0003
5	0	5	1	5.5	6.5	4	1	4	1	4.5	5.5	10235.1314	-0.0005
5	0	5	1	5.5	4.5	4	1	4	1	4.5	3.5		
6	2	4	1	6.5	5.5	6	1	5	1	6.5	5.5	10746.7035	-0.0020
6	2	4	1	6.5	7.5	6	1	5	1	6.5	7.5		
6	2	4	1	6.5	6.5	6	1	5	1	6.5	6.5	10746.7117	-0.0002
6	2	4	1	5.5	4.5	6	1	5	1	5.5	4.5	10747.7907	-0.0023
6	2	4	1	5.5	6.5	6	1	5	1	5.5	6.5	10747.7983	-0.0010
6	2	4	1	5.5	5.5	6	1	5	1	5.5	5.5	10747.7983	-0.0010
6	2	4	1	7.5	6.5	6	1	5	1	7.5	6.5	10751.2816	0.0011
6	2	4	1	7.5	8.5	6	1	5	1	7.5	8.5		
6	2	4	1	7.5	7.5	6	1	5	1	7.5	7.5	10751.2910	0.0034
6	2	4	1	4.5	3.5	6	1	5	1	4.5	3.5	10752.3629	-0.0005
6	2	4	1	4.5	5.5	6	1	5	1	4.5	5.5		
6	2	4	1	4.5	4.5	6	1	5	1	4.5	4.5	10752.3705	0.0002
5	2	3	1	5.5	4.5	5	1	4	1	5.5	4.5	11047.6346	-0.0017
5	2	3	1	5.5	6.5	5	1	4	1	5.5	6.5		
5	2	3	1	5.5	5.5	5	1	4	1	5.5	5.5	11047.6478	-0.0004
5	2	3	1	4.5	3.5	5	1	4	1	4.5	3.5	11049.8784	-0.0015
5	2	3	1	4.5	5.5	5	1	4	1	4.5	5.5		
5	2	3	1	4.5	4.5	5	1	4	1	4.5	4.5	11049.8910	-0.0004
5	2	3	1	6.5	5.5	5	1	4	1	6.5	5.5	11055.5749	0.0015
5	2	3	1	6.5	7.5	5	1	4	1	6.5	7.5		
5	2	3	1	6.5	6.5	5	1	4	1	6.5	6.5	11055.5903	0.0036
5	2	3	1	3.5	2.5	5	1	4	1	3.5	2.5	11057.8143	0.0005
5	2	3	1	3.5	4.5	5	1	4	1	3.5	4.5		
5	2	3	1	3.5	3.5	5	1	4	1	3.5	3.5	11057.8272	0.0005
3	1	3	1	3.5	2.5	2	0	2	1	2.5	1.5	11362.2362	-0.0011
3	1	3	1	3.5	4.5	2	0	2	1	2.5	3.5	11362.2444	0.0014
3	1	3	1	3.5	3.5	2	0	2	1	2.5	2.5	11362.2622	-0.0006
3	1	3	1	2.5	1.5	2	0	2	1	2.5	1.5	11364.9885	-0.0023
3	1	3	1	2.5	3.5	2	0	2	1	2.5	3.5	11364.9968	-0.0005
3	1	3	1	2.5	2.5	2	0	2	1	2.5	2.5	11365.0117	-0.0004
3	1	3	1	3.5	2.5	2	0	2	1	3.5	2.5	11370.2819	-0.0017
3	1	3	1	3.5	4.5	2	0	2	1	3.5	4.5	11370.2889	0.0001
3	1	3	1	3.5	3.5	2	0	2	1	3.5	3.5	11370.3042	-0.0018
3	1	3	1	2.5	1.5	2	0	2	1	1.5	0.5	11370.7135	-0.0019
3	1	3	1	2.5	3.5	2	0	2	1	1.5	2.5	11370.7225	0.0000
3	1	3	1	2.5	2.5	2	0	2	1	1.5	1.5	11370.7384	-0.0005
3	1	3	1	4.5	3.5	2	0	2	1	3.5	2.5	11376.1505	0.0022
3	1	3	1	4.5	5.5	2	0	2	1	3.5	4.5	11376.1578	0.0039
3	1	3	1	4.5	4.5	2	0	2	1	3.5	3.5	11376.1815	0.0013

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>s'</i>	<i>F<sub>1</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>s''</i>	<i>F<sub>1</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
3	1	3	1	1.5	0.5	2	0	2	1	1.5	1.5	11376.6071	0.0000
3	1	3	1	1.5	0.5	2	0	2	1	1.5	0.5		
3	1	3	1	1.5	2.5	2	0	2	1	1.5	2.5	11376.6222	-0.0007
3	1	3	1	1.5	1.5	2	0	2	1	1.5	1.5	11376.6417	-0.0011
3	1	3	1	1.5	0.5	2	0	2	1	0.5	0.5	11384.6642	0.0003
3	1	3	1	1.5	2.5	2	0	2	1	0.5	1.5	11384.6796	-0.0002
3	1	3	1	1.5	1.5	2	0	2	1	0.5	0.5	11384.6989	-0.0008
3	1	3	1	1.5	1.5	2	0	2	1	0.5	1.5		
4	2	2	1	4.5	3.5	4	1	3	1	4.5	3.5	11454.8599	0.0002
4	2	2	1	4.5	5.5	4	1	3	1	4.5	5.5		
4	2	2	1	4.5	4.5	4	1	3	1	4.5	4.5	11454.8757	0.0004
4	2	2	1	3.5	2.5	4	1	3	1	3.5	2.5	11458.9542	0.0007
4	2	2	1	3.5	4.5	4	1	3	1	3.5	4.5		
4	2	2	1	3.5	3.5	4	1	3	1	3.5	3.5	11458.9673	-0.0008
4	2	2	1	5.5	4.5	4	1	3	1	5.5	4.5	11466.5293	0.0025
4	2	2	1	5.5	6.5	4	1	3	1	5.5	6.5		
4	2	2	1	5.5	5.5	4	1	3	1	5.5	5.5	11466.5484	0.0027
4	2	2	1	2.5	1.5	4	1	3	1	2.5	1.5	11470.6303	-0.0028
4	2	2	1	2.5	3.5	4	1	3	1	2.5	3.5	11470.6388	-0.0004
4	2	2	1	2.5	2.5	4	1	3	1	2.5	2.5	11470.6533	-0.0004
3	2	1	1	3.5	4.5	3	1	2	1	3.5	4.5	11890.0026	-0.0001
3	2	1	1	3.5	3.5	3	1	2	1	3.5	3.5	11890.0166	-0.0002
3	2	1	1	2.5	1.5	3	1	2	1	2.5	1.5	11897.6764	-0.0024
3	2	1	1	2.5	3.5	3	1	2	1	2.5	3.5	11897.6822	-0.0012
3	2	1	1	2.5	2.5	3	1	2	1	2.5	2.5	11897.6935	-0.0008
3	2	1	1	4.5	3.5	3	1	2	1	4.5	3.5	11906.4287	0.0023
3	2	1	1	4.5	5.5	3	1	2	1	4.5	5.5	11906.4344	0.0034
3	2	1	1	4.5	4.5	3	1	2	1	4.5	4.5	11906.4525	0.0014
3	2	1	1	1.5	2.5	3	1	2	1	1.5	2.5	11914.1103	-0.0017
2	2	0	1	2.5	3.5	2	1	1	1	2.5	3.5	12279.4168	0.0001
2	2	0	1	2.5	2.5	2	1	1	1	2.5	2.5	12279.4263	0.0020
2	2	0	1	1.5	2.5	2	1	1	1	2.5	3.5	12285.1559	-0.0027
2	2	0	1	1.5	1.5	2	1	1	1	2.5	2.5	12285.1666	-0.0013
2	2	0	1	3.5	4.5	2	1	1	1	2.5	3.5	12287.4506	0.0040
2	2	0	1	3.5	3.5	2	1	1	1	2.5	2.5	12287.4579	0.0062
2	2	0	0	2.5	2.5	2	1	1	0	1.5	1.5	12291.4654	0.0012
2	2	0	1	2.5	1.5	2	1	1	1	3.5	2.5	12296.2473	-0.0032
2	2	0	1	2.5	3.5	2	1	1	1	3.5	4.5	12296.2554	-0.0015
2	2	0	1	2.5	2.5	2	1	1	1	3.5	3.5	12296.2764	-0.0029
2	2	0	0	1.5	1.5	2	1	1	0	1.5	1.5	12297.2042	-0.0024
2	2	0	1	3.5	2.5	2	1	1	1	3.5	2.5	12304.2833	0.0023
2	2	0	1	3.5	4.5	2	1	1	1	3.5	4.5	12304.2905	0.0037

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
2	2	0	1	3.5	3.5	2	1	1	1	3.5	3.5	12304.3082	0.0014
2	2	0	0	0.5	0.5	2	1	1	0	1.5	1.5	12305.2604	-0.0041
2	2	0	0	1.5	1.5	2	1	1	0	0.5	0.5	12314.0079	-0.0027
2	2	0	0	0.5	0.5	2	1	1	0	0.5	0.5	12322.0643	-0.0042
6	0	6	1	4.5	4.5	5	1	5	1	3.5	3.5	13211.2423	-0.0004
6	0	6	1	4.5	5.5	5	1	5	1	3.5	4.5	13211.2528	-0.0001
6	0	6	1	4.5	3.5	5	1	5	1	3.5	2.5	13211.2595	0.0020
6	0	6	1	7.5	7.5	5	1	5	1	6.5	6.5	13212.9801	-0.0003
6	0	6	1	7.5	8.5	5	1	5	1	6.5	7.5	13212.9942	0.0004
6	0	6	1	7.5	6.5	5	1	5	1	6.5	5.5	13212.9942	0.0004
6	0	6	1	5.5	5.5	5	1	5	1	4.5	4.5	13217.3444	-0.0004
6	0	6	1	5.5	6.5	5	1	5	1	4.5	5.5	13217.3580	0.0023
6	0	6	1	5.5	4.5	5	1	5	1	4.5	3.5	13217.3580	0.0023
6	0	6	1	6.5	6.5	5	1	5	1	5.5	5.5	13218.9877	-0.0001
6	0	6	1	6.5	7.5	5	1	5	1	5.5	6.5	13218.9877	-0.0001
6	0	6	1	6.5	5.5	5	1	5	1	5.5	4.5	13219.0005	0.0013
2	2	1	0	1.5	1.5	2	1	2	0	0.5	0.5	13230.0409	-0.0018
2	2	1	0	2.5	2.5	2	1	2	0	1.5	1.5	13231.4826	0.0013
2	2	1	1	2.5	2.5	2	1	2	1	2.5	2.5	13237.0988	-0.0002
2	2	1	1	2.5	3.5	2	1	2	1	2.5	3.5	13237.1100	-0.0001
2	2	1	1	2.5	1.5	2	1	2	1	2.5	1.5	13237.1167	0.0017
2	2	1	0	1.5	1.5	2	1	2	0	1.5	1.5	13237.9009	-0.0021
2	2	1	1	3.5	3.5	2	1	2	1	3.5	3.5	13238.2470	0.0038
2	2	1	1	3.5	4.5	2	1	2	1	3.5	4.5	13238.2737	0.0019
2	2	1	1	3.5	2.5	2	1	2	1	3.5	2.5	13238.2846	0.0045
2	2	1	0	0.5	0.5	2	1	2	0	0.5	0.5	13239.0303	-0.0040
2	2	1	1	1.5	1.5	2	1	2	1	2.5	2.5	13243.5178	-0.0035
2	2	1	1	1.5	2.5	2	1	2	1	2.5	3.5	13243.5285	-0.0030
2	2	1	1	1.5	0.5	2	1	2	1	2.5	1.5	13243.5344	-0.0016
2	2	1	1	3.5	3.5	2	1	2	1	2.5	2.5	13246.0808	0.0041
2	2	1	1	3.5	4.5	2	1	2	1	2.5	3.5	13246.0941	0.0050
2	2	1	1	3.5	2.5	2	1	2	1	2.5	1.5	13246.1021	0.0078
2	2	1	0	0.5	0.5	2	1	2	0	1.5	1.5	13246.8913	-0.0033
4	1	4	1	4.5	5.5	3	0	3	1	3.5	4.5	13452.2852	0.0015
4	1	4	1	4.5	4.5	3	0	3	1	3.5	3.5	13452.3046	-0.0010
4	1	4	1	3.5	2.5	3	0	3	1	3.5	2.5	13454.1732	-0.0021
4	1	4	1	3.5	4.5	3	0	3	1	3.5	4.5	13454.1814	0.0003
4	1	4	1	3.5	3.5	3	0	3	1	3.5	3.5	13454.1979	-0.0025
4	1	4	1	3.5	2.5	3	0	3	1	2.5	1.5	13457.2623	-0.0013
4	1	4	1	3.5	4.5	3	0	3	1	2.5	3.5	13457.2701	0.0010
4	1	4	1	3.5	3.5	3	0	3	1	2.5	2.5	13457.2881	-0.0016
4	1	4	1	4.5	5.5	3	0	3	1	4.5	5.5	13458.9283	0.0005



Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
4	1	4	1	4.5	4.5	3	0	3	1	4.5	4.5	13458.9456	-0.0018
4	1	4	1	2.5	3.5	3	0	3	1	2.5	3.5	13462.6772	0.0001
4	1	4	1	2.5	2.5	3	0	3	1	2.5	2.5	13462.6993	-0.0012
4	1	4	1	5.5	6.5	3	0	3	1	4.5	5.5	13464.3141	0.0037
4	1	4	1	5.5	5.5	3	0	3	1	4.5	4.5	13464.3376	0.0016
4	1	4	1	2.5	1.5	3	0	3	1	1.5	0.5	13469.3232	-0.0016
4	1	4	1	2.5	3.5	3	0	3	1	1.5	2.5	13469.3334	0.0008
4	1	4	1	2.5	2.5	3	0	3	1	1.5	1.5	13469.3536	-0.0017
3	2	2	1	1.5	1.5	3	1	3	1	1.5	1.5	13723.3890	-0.0008
3	2	2	1	1.5	2.5	3	1	3	1	1.5	2.5	13723.4089	-0.0008
3	2	2	1	4.5	4.5	3	1	3	1	4.5	4.5	13726.1543	0.0035
3	2	2	1	4.5	5.5	3	1	3	1	4.5	5.5	13726.1824	0.0013
3	2	2	1	4.5	3.5	3	1	3	1	4.5	3.5	13726.1913	0.0033
3	2	2	1	2.5	2.5	3	1	3	1	2.5	2.5	13729.2858	-0.0018
3	2	2	1	2.5	3.5	3	1	3	1	2.5	3.5	13729.3016	-0.0025
3	2	2	1	2.5	1.5	3	1	3	1	2.5	1.5	13729.3112	0.0000
3	2	2	1	3.5	3.5	3	1	3	1	3.5	3.5	13732.0326	-0.0005
3	2	2	1	3.5	4.5	3	1	3	1	3.5	4.5	13732.0526	-0.0018
3	2	2	1	3.5	2.5	3	1	3	1	3.5	2.5	13732.0616	0.0007
4	2	3	1	2.5	2.5	4	1	4	1	2.5	2.5	14380.8829	0.0003
4	2	3	1	2.5	3.5	4	1	4	1	2.5	3.5	14380.9089	0.0000
4	2	3	1	5.5	6.5	4	1	4	1	5.5	6.5	14384.0124	0.0002
4	2	3	1	5.5	4.5	4	1	4	1	5.5	4.5	14384.0203	0.0023
4	2	3	1	3.5	3.5	4	1	4	1	3.5	3.5	14389.6777	-0.0010
4	2	3	1	3.5	4.5	4	1	4	1	3.5	4.5	14389.7000	-0.0022
4	2	3	1	3.5	2.5	4	1	4	1	3.5	2.5	14389.7101	0.0009
4	2	3	1	4.5	4.5	4	1	4	1	4.5	4.5	14392.7388	-0.0009
4	2	3	1	4.5	5.5	4	1	4	1	4.5	5.5	14392.7636	-0.0022
4	2	3	1	4.5	3.5	4	1	4	1	4.5	3.5	14392.7715	-0.0003
5	1	5	1	5.5	4.5	4	0	4	1	4.5	3.5	15448.8191	0.0029
5	1	5	1	5.5	6.5	4	0	4	1	4.5	5.5	15448.8381	-0.0012
5	1	5	1	5.5	5.5	4	0	4	1	4.5	4.5	15452.0353	-0.0011
5	1	5	1	4.5	3.5	4	0	4	1	3.5	2.5	15452.0413	0.0009
5	1	5	1	4.5	5.5	4	0	4	1	3.5	4.5	15452.0595	-0.0016
5	1	5	1	4.5	4.5	4	0	4	1	3.5	3.5	15452.0595	-0.0016
5	1	5	1	6.5	5.5	4	0	4	1	5.5	4.5	15459.1011	0.0041
5	1	5	1	6.5	7.5	4	0	4	1	5.5	6.5	15459.1236	0.0015
5	1	5	1	6.5	6.5	4	0	4	1	5.5	5.5	15459.1236	0.0015
5	1	5	1	3.5	4.5	4	0	4	1	2.5	3.5	15462.3611	0.0011
5	1	5	1	3.5	3.5	4	0	4	1	2.5	2.5	15462.3802	-0.0018
7	0	7	1	5.5	5.5	6	1	6	1	4.5	4.5	16124.3639	-0.0012
7	0	7	1	5.5	6.5	6	1	6	1	4.5	5.5	16124.3725	0.0000

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
7	0	7	1	5.5	4.5	6	1	6	1	4.5	3.5	16124.3723	0.0000
7	0	7	1	8.5	8.5	6	1	6	1	7.5	7.5	16126.4248	-0.0019
7	0	7	1	8.5	9.5	6	1	6	1	7.5	8.5	16126.4363	0.0000
7	0	7	1	8.5	7.5	6	1	6	1	7.5	6.5	16126.4363	0.0000
7	0	7	1	6.5	6.5	6	1	6	1	5.5	5.5	16129.5649	-0.0015
7	0	7	1	6.5	7.5	6	1	6	1	5.5	6.5	16129.5749	0.0010
7	0	7	1	6.5	5.5	6	1	6	1	5.5	4.5	16129.5749	0.0010
7	0	7	1	7.5	7.5	6	1	6	1	6.5	6.5	16129.8899	-0.0003
7	0	7	1	7.5	8.5	6	1	6	1	6.5	7.5	16129.8899	-0.0003
7	0	7	1	7.5	6.5	6	1	6	1	6.5	5.5	16129.9012	0.0009
6	1	6	1	6.5	5.5	5	0	5	1	5.5	4.5	17397.6280	0.0005
6	1	6	1	6.5	7.5	5	0	5	1	5.5	6.5	17397.6280	0.0005
6	1	6	1	6.5	6.5	5	0	5	1	5.5	5.5	17397.6452	-0.0027
6	1	6	1	5.5	4.5	5	0	5	1	4.5	3.5	17399.7640	0.0013
6	1	6	1	5.5	6.5	5	0	5	1	4.5	5.5	17399.7640	0.0013
6	1	6	1	5.5	5.5	5	0	5	1	4.5	4.5	17399.7806	-0.0023
6	1	6	1	7.5	6.5	5	0	5	1	6.5	5.5	17406.1450	0.0032
6	1	6	1	7.5	8.5	5	0	5	1	6.5	7.5	17406.1450	0.0032
6	1	6	1	7.5	7.5	5	0	5	1	6.5	6.5	17406.1639	0.0007
6	1	6	1	4.5	3.5	5	0	5	1	3.5	2.5	17408.2962	0.0016
6	1	6	1	4.5	5.5	5	0	5	1	3.5	4.5	17408.2962	0.0016
6	1	6	1	4.5	4.5	5	0	5	1	3.5	3.5	17408.3134	-0.0024
2	2	1	1	2.5	2.5	1	1	0	1	1.5	1.5	17966.6017	0.0007
2	2	1	1	2.5	3.5	1	1	0	1	1.5	2.5	17966.6216	0.0006
2	2	1	1	2.5	1.5	1	1	0	1	1.5	0.5	17966.6364	-0.0004
2	2	1	1	1.5	1.5	1	1	0	1	1.5	1.5	17973.0205	-0.0027
2	2	1	1	1.5	2.5	1	1	0	1	1.5	2.5	17973.0396	-0.0029
2	2	1	1	2.5	3.5	1	1	0	1	2.5	3.5	17974.4449	-0.0012
2	2	1	1	2.5	2.5	1	1	0	1	2.5	2.5	17974.4624	-0.0029
2	2	1	1	3.5	2.5	1	1	0	1	2.5	1.5	17983.4190	0.0018
2	2	1	1	3.5	4.5	1	1	0	1	2.5	3.5	17983.4291	0.0040
2	2	1	1	3.5	3.5	1	1	0	1	2.5	2.5	17983.4446	0.0016
2	2	1	0	1.5	1.5	1	1	0	0	0.5	0.5	17987.1745	-0.0012
2	2	1	0	0.5	0.5	1	1	0	0	0.5	0.5	17996.1644	-0.0029
2	2	0	0	1.5	1.5	1	1	1	0	0.5	0.5	18300.0083	-0.0009
2	2	0	1	2.5	2.5	1	1	1	1	2.5	2.5	18307.7322	-0.0020
2	2	0	1	2.5	3.5	1	1	1	1	2.5	3.5	18307.7507	-0.0034
2	2	0	1	2.5	1.5	1	1	1	1	2.5	1.5	18307.7617	-0.0010
2	2	0	0	0.5	0.5	1	1	1	0	0.5	0.5	18308.0644	-0.0027
2	2	0	1	3.5	3.5	1	1	1	1	2.5	2.5	18315.7648	0.0032
2	2	0	1	3.5	4.5	1	1	1	1	2.5	3.5	18315.7860	0.0019
2	2	0	1	3.5	2.5	1	1	1	1	2.5	1.5	18315.7981	0.0049

Table 11S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>35</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
2	2	0	1	2.5	1.5	1	1	1	1	1.5	0.5	18324.5593	0.0002
2	2	0	1	2.5	3.5	1	1	1	1	1.5	2.5	18324.5733	0.0010
2	2	0	1	2.5	2.5	1	1	1	1	1.5	1.5	18324.5879	-0.0002
2	2	0	1	1.5	0.5	1	1	1	1	1.5	0.5	18330.2979	-0.0025
2	2	0	1	1.5	1.5	1	1	1	1	1.5	0.5		
2	2	0	1	1.5	2.5	1	1	1	1	1.5	2.5	18330.3122	-0.0021
2	2	0	1	1.5	1.5	1	1	1	1	1.5	1.5	18330.3278	-0.0040
7	1	7	1	7.5	8.5	6	0	6	1	6.5	7.5	19345.7581	-0.0009
7	1	7	1	6.5	7.5	6	0	6	1	5.5	6.5	19347.1173	-0.0011
7	1	7	1	8.5	9.5	6	0	6	1	7.5	8.5	19352.4876	0.0013
7	1	7	1	5.5	6.5	6	0	6	1	4.5	5.5	19353.9428	-0.0002
3	2	2	1	3.5	2.5	2	1	1	1	2.5	1.5	20337.6728	0.0010
3	2	2	1	3.5	4.5	2	1	1	1	2.5	3.5		
3	2	2	1	3.5	3.5	2	1	1	1	2.5	2.5	20337.6840	0.0009
3	2	2	0	2.5	2.5	2	1	1	0	1.5	1.5	20349.7234	-0.0022
3	2	2	0	1.5	1.5	2	1	1	0	1.5	1.5	20349.7310	-0.0008
3	2	2	1	4.5	3.5	2	1	1	1	3.5	2.5	20354.5008	0.0020
3	2	2	1	4.5	5.5	2	1	1	1	3.5	4.5	20354.5093	0.0034
3	2	2	1	4.5	4.5	2	1	1	1	3.5	3.5	20354.5328	0.0029
3	2	2	0	1.5	1.5	2	1	1	0	0.5	0.5	20366.5338	-0.0019

Table 12S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>s'</i>	<i>F<sub>1</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>s''</i>	<i>F<sub>1</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
1	1	1	1	1.5	1.5	0	0	0	1	1.5	1.5	6646.3945	-0.0005
1	1	1	1	1.5	2.5	0	0	0	1	1.5	2.5	6646.4114	-0.0003
1	1	1	1	2.5	1.5	0	0	0	1	1.5	0.5	6659.6236	0.0008
1	1	1	1	2.5	3.5	0	0	0	1	1.5	2.5	6659.6325	0.0022
1	1	1	1	2.5	2.5	0	0	0	1	1.5	1.5	6659.6504	0.0027
1	1	1	0	0.5	0.5	0	0	0	0	1.5	1.5	6670.2276	-0.0018
2	1	2	1	2.5	1.5	1	0	1	1	1.5	0.5	8994.2439	-0.0020
2	1	2	1	2.5	3.5	1	0	1	1	1.5	2.5	8994.2520	-0.0002
2	1	2	1	2.5	2.5	1	0	1	1	1.5	1.5	8994.2658	0.0011
2	1	2	0	1.5	1.5	1	0	1	0	1.5	1.5	8998.6851	-0.0012
2	1	2	1	2.5	3.5	1	0	1	1	2.5	3.5	9001.2987	-0.0015
2	1	2	1	2.5	2.5	1	0	1	1	2.5	2.5	9001.3097	0.0018
2	1	2	0	0.5	0.5	1	0	1	0	1.5	1.5	9004.8785	-0.0012
2	1	2	0	1.5	1.5	1	0	1	0	2.5	2.5	9005.7346	0.0013
2	1	2	1	3.5	2.5	1	0	1	1	2.5	1.5	9007.4584	-0.0002
2	1	2	1	3.5	4.5	1	0	1	1	2.5	3.5	9007.4679	0.0027
2	1	2	1	3.5	3.5	1	0	1	1	2.5	2.5	9007.4909	0.0020
2	1	2	0	1.5	1.5	1	0	1	0	0.5	0.5	9011.3665	-0.0011
2	1	2	0	0.5	0.5	1	0	1	0	0.5	0.5	9017.5599	-0.0010
5	0	5	1	3.5	3.5	4	1	4	1	2.5	2.5	10207.9378	0.0032
5	0	5	1	3.5	4.5	4	1	4	1	2.5	3.5	10207.9428	-0.0026
5	0	5	1	6.5	6.5	4	1	4	1	5.5	5.5	10210.0358	0.0006
5	0	5	1	6.5	7.5	4	1	4	1	5.5	6.5	10210.0521	0.0007
5	0	5	1	6.5	5.5	4	1	4	1	5.5	4.5	10210.0521	0.0007
5	0	5	1	4.5	4.5	4	1	4	1	3.5	3.5	10214.2761	-0.0013
5	0	5	1	4.5	5.5	4	1	4	1	3.5	4.5	10214.2871	0.0006
5	0	5	1	4.5	3.5	4	1	4	1	3.5	2.5	10214.2929	0.0024
5	0	5	1	5.5	5.5	4	1	4	1	4.5	4.5	10216.3397	-0.0015
5	0	5	1	5.5	6.5	4	1	4	1	4.5	5.5	10216.3541	0.0004
5	0	5	1	5.5	4.5	4	1	4	1	4.5	3.5	10216.3541	0.0004
5	2	3	1	5.5	4.5	5	1	4	1	5.5	4.5	10749.7333	-0.0019
5	2	3	1	5.5	6.5	5	1	4	1	5.5	6.5	10749.7333	-0.0019
5	2	3	1	5.5	5.5	5	1	4	1	5.5	5.5	10749.7455	-0.0005
5	2	3	1	4.5	3.5	5	1	4	1	4.5	3.5	10751.4533	-0.0016
5	2	3	1	4.5	5.5	5	1	4	1	4.5	5.5	10751.4533	-0.0016
5	2	3	1	4.5	4.5	5	1	4	1	4.5	4.5	10751.4651	-0.0003
5	2	3	1	6.5	5.5	5	1	4	1	6.5	5.5	10755.8219	0.0008
5	2	3	1	6.5	7.5	5	1	4	1	6.5	7.5	10755.8219	0.0008
5	2	3	1	6.5	6.5	5	1	4	1	6.5	6.5	10755.8368	0.0035
4	2	2	1	4.5	3.5	4	1	3	1	4.5	3.5	11148.4945	-0.0012
4	2	2	1	4.5	5.5	4	1	3	1	4.5	5.5	11148.4945	-0.0012
4	2	2	1	4.5	4.5	4	1	3	1	4.5	4.5	11148.5097	-0.0005

Table 12S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>s'</i>	<i>F<sub>1</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>s''</i>	<i>F<sub>1</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	2	2	1	3.5	2.5	4	1	3	1	3.5	2.5	11151.6734	0.0003
4	2	2	1	3.5	4.5	4	1	3	1	3.5	4.5		
4	2	2	1	3.5	3.5	4	1	3	1	3.5	3.5	11151.6864	-0.0004
4	2	2	1	5.5	4.5	4	1	3	1	5.5	4.5	11157.5575	0.0017
4	2	2	1	5.5	6.5	4	1	3	1	5.5	6.5		
4	2	2	1	5.5	5.5	4	1	3	1	5.5	5.5	11157.5751	0.0018
4	2	2	1	2.5	1.5	4	1	3	1	2.5	1.5	11160.7445	-0.0028
4	2	2	1	2.5	3.5	4	1	3	1	2.5	3.5	11160.7521	-0.0010
4	2	2	1	2.5	2.5	4	1	3	1	2.5	2.5	11160.7651	-0.0013
3	1	3	1	3.5	2.5	2	0	2	1	2.5	1.5	11190.7613	-0.0014
3	1	3	1	3.5	4.5	2	0	2	1	2.5	3.5	11190.7692	0.0010
3	1	3	1	3.5	3.5	2	0	2	1	2.5	2.5	11190.7879	0.0003
3	1	3	1	2.5	1.5	2	0	2	1	2.5	1.5	11192.9370	-0.0024
3	1	3	1	2.5	3.5	2	0	2	1	2.5	3.5	11192.9450	-0.0006
3	1	3	1	2.5	2.5	2	0	2	1	2.5	2.5	11192.9604	0.0003
3	1	3	1	3.5	2.5	2	0	2	1	3.5	2.5	11197.0454	-0.0018
3	1	3	1	3.5	4.5	2	0	2	1	3.5	4.5	11197.0527	0.0005
3	1	3	1	3.5	3.5	2	0	2	1	3.5	3.5	11197.0690	0.0006
3	1	3	1	2.5	1.5	2	0	2	1	1.5	0.5	11197.4111	-0.0014
3	1	3	1	2.5	3.5	2	0	2	1	1.5	2.5	11197.4197	0.0001
3	1	3	1	2.5	2.5	2	0	2	1	1.5	1.5	11197.4364	0.0003
3	1	3	1	4.5	5.5	2	0	2	1	3.5	4.5	11201.6955	0.0031
3	1	3	1	4.5	4.5	2	0	2	1	3.5	3.5	11201.7190	0.0013
3	1	3	1	1.5	0.5	2	0	2	1	1.5	1.5	11202.0663	-0.0006
3	1	3	1	1.5	0.5	2	0	2	1	1.5	0.5		
3	1	3	1	1.5	2.5	2	0	2	1	1.5	2.5	11202.0824	-0.0004
3	1	3	1	1.5	1.5	2	0	2	1	1.5	1.5	11202.1022	-0.0006
3	1	3	1	1.5	0.5	2	0	2	1	0.5	0.5	11208.3575	0.0005
3	1	3	1	1.5	2.5	2	0	2	1	0.5	1.5	11208.3732	0.0002
3	1	3	1	1.5	1.5	2	0	2	1	0.5	0.5	11208.3929	0.0000
3	1	3	1	1.5	1.5	2	0	2	1	0.5	1.5		
3	2	1	1	3.5	2.5	3	1	2	1	3.5	2.5	11580.4292	0.0012
3	2	1	1	3.5	4.5	3	1	2	1	3.5	4.5		
3	2	1	1	3.5	3.5	3	1	2	1	3.5	3.5	11580.4438	0.0008
3	2	1	1	4.5	3.5	3	1	2	1	4.5	3.5	11593.2796	0.0041
3	2	1	1	4.5	5.5	3	1	2	1	4.5	5.5		
3	2	1	1	4.5	4.5	3	1	2	1	4.5	4.5	11593.2977	0.0014
3	2	1	1	1.5	2.5	3	1	2	1	1.5	2.5	11599.2776	-0.0015
3	2	1	1	1.5	1.5	3	1	2	1	1.5	1.5	11599.2936	0.0023
2	2	0	1	2.5	3.5	2	1	1	1	2.5	3.5	11970.4699	-0.0004
2	2	0	1	2.5	2.5	2	1	1	1	2.5	2.5	11970.4796	0.0024
2	2	0	1	1.5	2.5	2	1	1	1	2.5	3.5	11974.9526	-0.0023

Table 12S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
2	2	0	1	1.5	1.5	2	1	1	1	2.5	2.5	11974.9626	-0.0012
2	2	0	1	3.5	4.5	2	1	1	1	2.5	3.5	11976.7493	0.0050
2	2	0	0	2.5	2.5	2	1	1	0	1.5	1.5	11979.9379	0.0015
2	2	0	1	2.5	3.5	2	1	1	1	3.5	4.5	11983.7032	-0.0011
2	2	0	1	2.5	2.5	2	1	1	1	3.5	3.5	11983.7239	-0.0012
2	2	0	0	1.5	1.5	2	1	1	0	1.5	1.5	11984.4189	-0.0025
2	2	0	1	3.5	2.5	2	1	1	1	3.5	2.5	11989.9741	0.0011
2	2	0	1	3.5	4.5	2	1	1	1	3.5	4.5	11989.9815	0.0033
2	2	0	1	3.5	3.5	2	1	1	1	3.5	3.5	11989.9960	0.0000
2	2	0	0	0.5	0.5	2	1	1	0	1.5	1.5	11990.7089	-0.0035
2	2	0	0	1.5	1.5	2	1	1	0	0.5	0.5	11997.6316	-0.0022
2	2	0	0	0.5	0.5	2	1	1	0	0.5	0.5	12003.9217	-0.0030
2	2	1	1	2.5	2.5	2	1	2	1	3.5	3.5	12921.5730	-0.0006
2	2	1	1	2.5	3.5	2	1	2	1	3.5	4.5	12921.5990	-0.0020
2	2	1	0	1.5	1.5	2	1	2	0	0.5	0.5	12922.1712	-0.0021
2	2	1	0	2.5	2.5	2	1	2	0	1.5	1.5	12923.3334	0.0013
2	2	1	1	2.5	2.5	2	1	2	1	2.5	2.5	12927.7541	-0.0006
2	2	1	1	2.5	3.5	2	1	2	1	2.5	3.5	12927.7659	-0.0001
2	2	1	1	2.5	1.5	2	1	2	1	2.5	1.5	12927.7728	0.0018
2	2	1	0	1.5	1.5	2	1	2	0	1.5	1.5	12928.3647	-0.0020
2	2	1	1	3.5	3.5	2	1	2	1	3.5	3.5	12928.6170	0.0039
2	2	1	1	3.5	4.5	2	1	2	1	3.5	4.5	12928.6440	0.0016
2	2	1	1	3.5	2.5	2	1	2	1	3.5	2.5	12928.6551	0.0040
2	2	1	0	0.5	0.5	2	1	2	0	0.5	0.5	12929.2190	-0.0033
2	2	1	1	1.5	1.5	2	1	2	1	2.5	2.5	12932.7877	-0.0025
2	2	1	1	1.5	2.5	2	1	2	1	2.5	3.5	12932.7984	-0.0019
2	2	1	1	1.5	0.5	2	1	2	1	2.5	1.5	12932.8098	0.0050
2	2	1	0	0.5	0.5	2	1	2	0	1.5	1.5	12935.4128	-0.0028
6	0	6	1	7.5	7.5	5	1	5	1	6.5	6.5	13163.0961	-0.0010
6	0	6	1	7.5	8.5	5	1	5	1	6.5	7.5	13163.1095	-0.0003
6	0	6	1	7.5	6.5	5	1	5	1	6.5	5.5	13166.4276	-0.0010
6	0	6	1	5.5	5.5	5	1	5	1	4.5	4.5	13166.4387	-0.0013
6	0	6	1	5.5	6.5	5	1	5	1	4.5	5.5	13167.6964	-0.0012
6	0	6	1	6.5	7.5	5	1	5	1	5.5	6.5	13167.7122	0.0036
6	0	6	1	6.5	5.5	5	1	5	1	5.5	4.5	13257.1123	-0.0006
4	1	4	1	4.5	3.5	3	0	3	1	3.5	2.5	13257.1189	0.0014
4	1	4	1	4.5	5.5	3	0	3	1	3.5	4.5	13257.1379	-0.0009
4	1	4	1	4.5	4.5	3	0	3	1	3.5	3.5	13258.6145	-0.0020
4	1	4	1	3.5	2.5	3	0	3	1	3.5	2.5	13258.6218	-0.0004

Table 12S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

<i>J'</i>	<i>K<sub>a</sub>'</i>	<i>K<sub>c</sub>'</i>	<i>s'</i>	<i>F<sub>1</sub>'</i>	<i>F'</i>	<i>J''</i>	<i>K<sub>a</sub>''</i>	<i>K<sub>c</sub>''</i>	<i>s''</i>	<i>F<sub>1</sub>''</i>	<i>F''</i>	Observed	Obs - Calc
4	1	4	1	3.5	3.5	3	0	3	1	3.5	3.5	13258.6400	-0.0009
4	1	4	1	3.5	2.5	3	0	3	1	2.5	1.5	13261.0105	-0.0016
4	1	4	1	3.5	4.5	3	0	3	1	2.5	3.5	13261.0180	0.0006
4	1	4	1	3.5	3.5	3	0	3	1	2.5	2.5	13261.0366	-0.0009
4	1	4	1	4.5	5.5	3	0	3	1	4.5	5.5	13262.2684	0.0005
4	1	4	1	4.5	4.5	3	0	3	1	4.5	4.5	13262.2862	-0.0005
4	1	4	1	5.5	6.5	3	0	3	1	4.5	5.5	13266.5416	0.0026
4	1	4	1	5.5	5.5	3	0	3	1	4.5	4.5	13266.5654	0.0017
4	1	4	1	2.5	3.5	3	0	3	1	1.5	2.5	13270.4615	-0.0004
4	1	4	1	2.5	2.5	3	0	3	1	1.5	1.5	13270.4813	-0.0027
3	2	2	1	4.5	4.5	3	1	3	1	4.5	4.5	13419.2635	0.0026
3	2	2	1	4.5	5.5	3	1	3	1	4.5	5.5	13419.2916	0.0003
3	2	2	1	4.5	3.5	3	1	3	1	4.5	3.5	13419.3008	0.0026
3	2	2	1	3.5	3.5	3	1	3	1	3.5	3.5	13423.9149	-0.0003
3	2	2	1	3.5	4.5	3	1	3	1	3.5	4.5	13423.9347	-0.0017
3	2	2	1	3.5	2.5	3	1	3	1	3.5	2.5	13423.9441	0.0012
4	2	3	1	2.5	3.5	4	1	4	1	2.5	3.5	14078.0806	-0.0024
4	2	3	1	5.5	5.5	4	1	4	1	5.5	5.5	14080.5014	0.0041
4	2	3	1	5.5	6.5	4	1	4	1	5.5	6.5	14080.5280	-0.0007
4	2	3	1	5.5	4.5	4	1	4	1	5.5	4.5	14080.5358	0.0014
4	2	3	1	4.5	4.5	4	1	4	1	4.5	4.5	14087.4089	-0.0022
4	2	3	1	4.5	5.5	4	1	4	1	4.5	5.5	14087.4339	-0.0029
4	2	3	1	4.5	3.5	4	1	4	1	4.5	3.5	14087.4422	-0.0006
5	1	5	1	5.5	4.5	4	0	4	1	4.5	3.5	15231.5798	0.0020
5	1	5	1	5.5	6.5	4	0	4	1	4.5	5.5	15231.5986	-0.0015
5	1	5	1	5.5	5.5	4	0	4	1	4.5	4.5	15231.5986	-0.0015
5	1	5	1	4.5	3.5	4	0	4	1	3.5	2.5	15234.0911	0.0026
5	1	5	1	4.5	5.5	4	0	4	1	3.5	4.5	15234.0911	0.0026
5	1	5	1	4.5	4.5	4	0	4	1	3.5	3.5	15234.1097	-0.0009
5	1	5	1	6.5	5.5	4	0	4	1	5.5	4.5	15239.6025	0.0028
5	1	5	1	6.5	7.5	4	0	4	1	5.5	6.5	15239.6025	0.0028
5	1	5	1	6.5	6.5	4	0	4	1	5.5	5.5	15239.6241	0.0002
5	1	5	1	3.5	2.5	4	0	4	1	2.5	1.5	15242.1307	-0.0006
5	1	5	1	3.5	4.5	4	0	4	1	2.5	3.5	15242.1366	0.0004
5	1	5	1	3.5	3.5	4	0	4	1	2.5	2.5	15242.1564	-0.0010
6	1	6	1	5.5	4.5	5	0	5	1	4.5	3.5	17162.6530	-0.0008
6	1	6	1	5.5	6.5	5	0	5	1	4.5	5.5	17162.6530	-0.0008
6	1	6	1	5.5	5.5	5	0	5	1	4.5	4.5	17162.6723	-0.0010
6	1	6	1	7.5	6.5	5	0	5	1	6.5	5.5	17167.6312	0.0016
6	1	6	1	7.5	8.5	5	0	5	1	6.5	7.5	17167.6312	0.0016
6	1	6	1	7.5	7.5	5	0	5	1	6.5	6.5	17167.6488	-0.0013
2	2	1	1	2.5	2.5	1	1	0	1	1.5	1.5	17613.1141	0.0008

Table 12S: Observed Transition Frequencies (in MHz) for CH<sub>2</sub>CH<sup>37</sup>Cl-DCCH Using the Balle-Flygare Spectrometer

$J'$	$K_a'$	$K_c'$	$s'$	$F_1'$	$F'$	$J''$	$K_a''$	$K_c''$	$s''$	$F_1''$	$F''$	Observed	Obs - Calc
2	2	1	1	2.5	3.5	1	1	0	1	1.5	2.5	17613.1338	0.0002
2	2	1	1	2.5	1.5	1	1	0	1	1.5	0.5	17613.1483	-0.0011
2	2	1	1	1.5	1.5	1	1	0	1	1.5	1.5	17618.1474	-0.0015
2	2	1	1	1.5	2.5	1	1	0	1	1.5	2.5	17618.1649	-0.0031
2	2	1	1	1.5	1.5	1	1	0	1	1.5	0.5	17618.1798	-0.0034
2	2	1	1	1.5	0.5	1	1	0	1	1.5	0.5		
2	2	1	1	2.5	3.5	1	1	0	1	2.5	3.5	17619.3011	-0.0007
2	2	1	1	2.5	2.5	1	1	0	1	2.5	2.5	17619.3183	-0.0022
2	2	1	1	3.5	2.5	1	1	0	1	2.5	1.5	17626.3366	0.0010
2	2	1	1	3.5	4.5	1	1	0	1	2.5	3.5	17626.3468	0.0036
2	2	1	1	3.5	3.5	1	1	0	1	2.5	2.5	17626.3615	0.0016
2	2	1	0	1.5	1.5	1	1	0	0	0.5	0.5	17629.3042	-0.0010
2	2	1	0	0.5	0.5	1	1	0	0	0.5	0.5	17636.3519	-0.0023
2	2	0	0	1.5	1.5	1	1	1	0	0.5	0.5	17949.2969	-0.0007
2	2	0	1	2.5	2.5	1	1	1	1	2.5	2.5	17955.3910	-0.0017
2	2	0	1	2.5	3.5	1	1	1	1	2.5	3.5	17955.4094	-0.0027
2	2	0	1	2.5	1.5	1	1	1	1	2.5	1.5	17955.4207	0.0003
2	2	0	0	0.5	0.5	1	1	1	0	0.5	0.5	17955.5863	-0.0022
2	2	0	1	3.5	3.5	1	1	1	1	2.5	2.5	17961.6659	0.0023
2	2	0	1	3.5	4.5	1	1	1	1	2.5	3.5	17961.6879	0.0018
2	2	0	1	3.5	2.5	1	1	1	1	2.5	1.5	17961.7000	0.0049
2	2	0	1	2.5	1.5	1	1	1	1	1.5	0.5	17968.6175	-0.0008
2	2	0	1	2.5	3.5	1	1	1	1	1.5	2.5	17968.6314	0.0006
2	2	0	1	2.5	2.5	1	1	1	1	1.5	1.5	17968.6453	-0.0001
3	2	2	1	3.5	4.5	2	1	1	1	2.5	3.5	19960.7240	-0.0005
3	2	2	1	3.5	3.5	2	1	1	1	2.5	2.5	19960.7350	0.0016
3	2	2	0	2.5	2.5	2	1	1	0	1.5	1.5	19970.1920	-0.0020
3	2	2	1	4.5	3.5	2	1	1	1	3.5	2.5	19973.9480	0.0013
3	2	2	1	4.5	5.5	2	1	1	1	3.5	4.5	19973.9567	0.0032
3	2	2	1	4.5	4.5	2	1	1	1	3.5	3.5	19973.9782	0.0018
3	2	2	0	1.5	1.5	2	1	1	0	0.5	0.5	19983.4082	-0.0014



Table 13S: Rotation matrices and calculated nuclear quadrupole coupling tensors for six isotopologues of vinyl chloride-HCCH.

Isotopologue	Rotation Matrix	Calculated Quadrupole Tensor
$\text{CH}_2^{13}\text{CHCl-HCCH}$	$\begin{pmatrix} 0.9999966 & -0.0026124 & 0.0000000 \\ 0.0026124 & 0.9999966 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 35.7973 & 11.6541 & 0.0000 \\ 11.6541 & -67.1833 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$
$^{13}\text{CH}_2\text{CHCl-HCCH}$	$\begin{pmatrix} 0.9999260 & -0.0121671 & 0.0000000 \\ 0.0121671 & 0.9999260 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 36.0106 & 10.6681 & 0.0000 \\ 10.6681 & -67.3966 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$
$\text{CH}_2\text{CHCl-H}^{13}\text{CCH}$	$\begin{pmatrix} 0.9999922 & -0.0039370 & 0.0000000 \\ 0.0039370 & 0.9999922 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 35.8280 & 11.5177 & 0.0000 \\ 11.5177 & -67.2140 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$
$\text{CH}_2\text{CHCl-HC}^{13}\text{CH}$	$\begin{pmatrix} 0.9999716 & 0.0075317 & 0.0000000 \\ -0.0075317 & 0.9999716 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 35.5503 & 12.6963 & 0.0000 \\ 12.6963 & -66.9363 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$
$\text{CH}_2\text{CHCl-H}^{13}\text{C}^{13}\text{CH}$	$\begin{pmatrix} 0.9999937 & 0.0035597 & 0.0000000 \\ -0.0035597 & 0.9999937 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 35.6495 & 12.2888 & 0.0000 \\ 12.2888 & -67.0355 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$
$\text{CH}_2\text{CHCl-DCCH}$	$\begin{pmatrix} 0.9999527 & -0.0097287 & 0.0000000 \\ 0.0097287 & 0.9999527 & 0.0000000 \\ 0.0000000 & 0.0000000 & 1.0000000 \end{pmatrix}$	$\begin{pmatrix} 35.9579 & 10.9201 & 0.0000 \\ 10.9201 & -67.3439 & 0.0000 \\ 0.0000 & 0.0000 & 31.3860 \end{pmatrix}$

The rotation matrix,  $R$ , is the eigenvector matrix that diagonalizes the moment of inertia tensor

$$I = \begin{pmatrix} I_{aa} & I_{ab} & I_{ac} \\ I_{ba} & I_{bb} & I_{bc} \\ I_{ca} & I_{cb} & I_{cc} \end{pmatrix}$$

for each isotopologue when the inertia tensor is expressed in the principal axis system of the most abundant isotopologue. The calculated quadrupole constant tensor is then determined via  $R^{-1} \cdot Q \cdot R$ , where  $Q$  is the quadrupole coupling tensor for  $^{12}\text{CH}_2^{12}\text{CH}^{35}\text{Cl-H}^{12}\text{C}^{12}\text{CH}$  as given in the first column of Table 3.