

SUPPORTING INFORMATION

Table S1: List of $^{14}\text{NH}_3$ lines reported in the literature that were resonantly pumped by CW gas lasers (CO_2 or N_2O)^[14]. The THz lines occur inside the $\nu_2 = 1$ vibrational band. The MIR pumping lines occur between the ground state and the $\nu_2 = 1$ band. Lines having a possible competing laser line are labelled with an asterisk. Assuming that the pump laser is perfectly tuned to the centre of the ammonia line, the associated molecular gain factor is reported. Seq. stands for sequence bands.

HITRAN THz frequency [GHz]	THz QN	G_m [uG_m]	Pump laser line	MIR QN	Ref.
1030.5299	sQ(4,3)*	2.4E-18	CO_2 , Seq. 9P(17)	sR(3,3)	[31]
2669.4110	aR(5,1)	1.6E-18	CO_2 , Seq. 9P(7)	aR(5,1)	[35]
3442.2588	sR(3,3)*	1.1E-18	CO_2 , Seq. 9P(17)	sR(3,3)	[31]
3679.5915	aR(7,7)*	2.9E-19	N_2O , P(13)	aQ(8,7)	[30]
7036.9995	aR(13,13)	3.9E-21	N_2O , P(29)	aQ(14,13)	[34]

Table S2: List of $^{15}\text{NH}_3$ lines reported in the literature that were resonantly pumped by a CO_2 CW laser or a QCL^[14,27]. The THz lines occur within the $\nu_2 = 1$ vibrational band. The MIR pumping lines occur between the ground and the $\nu_2 = 1$ states. Lines having a possible competing laser line are labelled with an asterisk. We have added our G_m factor. Calculations are performed assuming that the pump laser is perfectly tuned to the centre of the ammonia line. Seq. stands for sequence bands.

HITRAN THz frequency [GHz]	THz QN	G_m [uG_m]	Pump laser line	MIR QN	Ref.
571.1	sQ(13,7)	2.1E-21 ^{a)}	CO_2 , Seq. 10P(5)	sQ(13,7)	[35]
802.9860	aR(2,0)	5.7E-18	CO_2 , 10R(42)	aR(2,0)	[32,35]
1096.5	sQ(12,11)	1.8E-19 ^{a)}	CO_2 , Seq. 10P(7)	sQ(12,11)	[35]
1371.4	aR(3,3)	2.2E-18 ^{a)}	CO_2 , Seq. 10P(35)	aQ(4,3)	[32,35]
1962.7496	aR(4,4)	9.4E-19	$^{13}\text{CO}_2$, 10R(18)	aQ(5,4)	[33]
2679.8574	aR(5,2)	2.2E-19	CO_2 , Seq. 10P(31)	aQ(6,2)	[32,35]
3201.8854	aR(6,5)	4.4E-19	CO_2 , Seq. 9R(7)	aR(6,5)	[35]
4416.6765	sR(5,0)	3.3E-18	QCL	sR(5,0)	[27]
4423.6044	sR(5,1)*	1.6E-18	QCL	sR(5,1)	[27]
4444.5206	sR(5,2)*	1.4E-18	QCL	sR(5,2)	[27]
4480.2496	sR(5,3)*	2.2E-18	QCL	sR(5,3)	[27]
4532.1389	sR(5,4)*	6.7E-19	QCL	sR(5,4)	[27]

^{a)} (Lines absent from our catalogues because they are not reported in HITRAN database. For these lines, the THz frequencies correspond to the conversion of the wavelengths reported in the corresponding reference. The G_m value was calculated by scaling the G_m value of the corresponding pair of pump/probe transitions of $^{14}\text{NH}_3$ by the ratio of molar masses of the two species.)

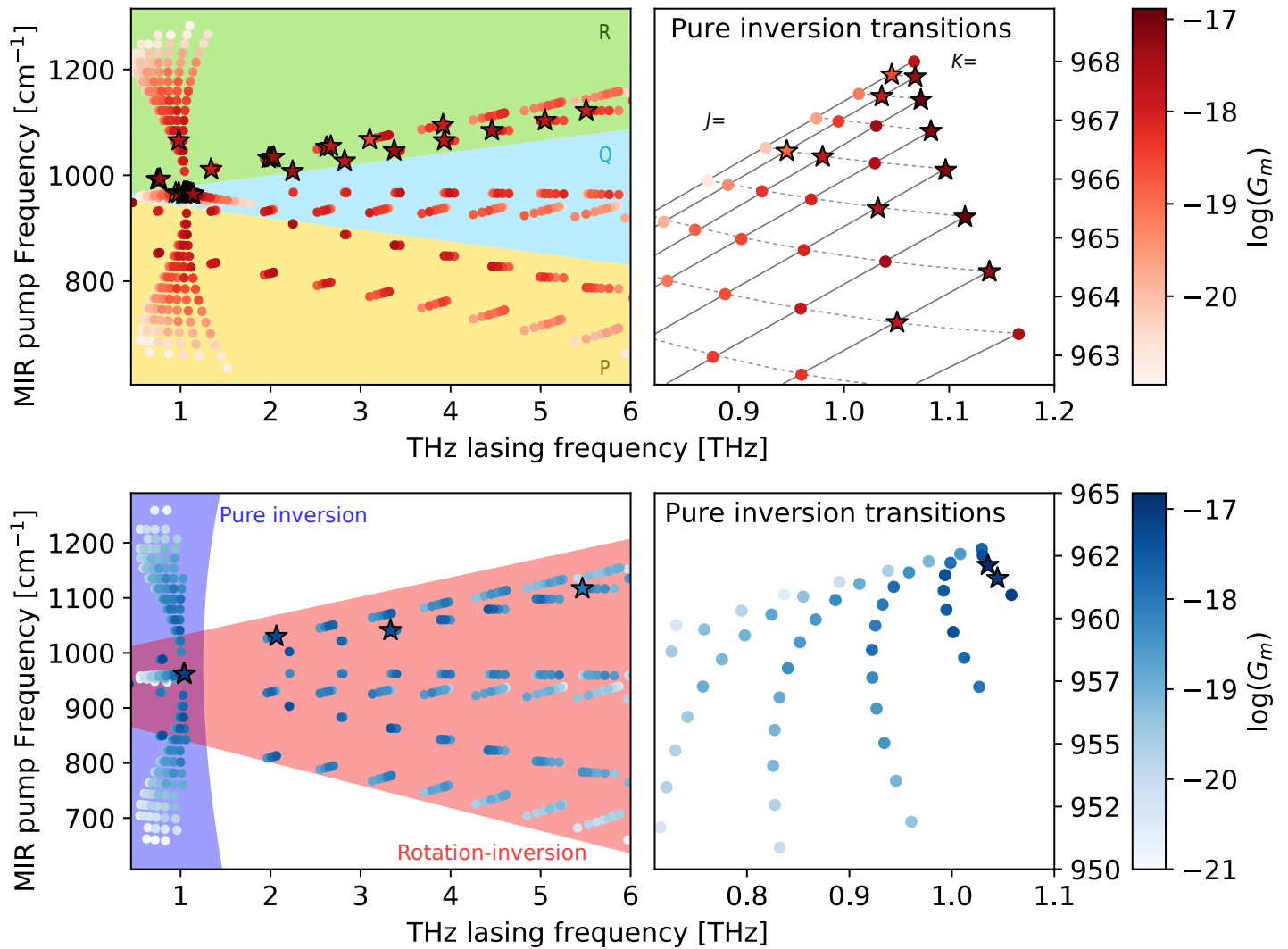


Figure S1: Lasing THz transitions of ¹⁴NH₃ (top, in shades of red) and ¹⁵NH₃ (bottom, in shades of blue) and corresponding gain factors as a function of the MIR pump frequency in the ν_2 band. Predicted and observed lasing lines are represented by dot and star symbols, respectively. *Left panel:* THz laser lines below 6 THz. *Right panel:* Zoom onto the pure inversion transitions resulting from Q-branch pumping. The color coding ranges from light to dark color with increasing gain factor values, in logarithmic scale. On the top left plot, the pump P-, Q-, and R-branches regions are represented by yellow, light blue, and green areas, respectively. Each branch is split because the a/s splitting. On the bottom left plot, the lasing pure inversion and rotation-inversion transitions regions are represented by light blue and red areas, respectively. The J (dotted line) and K (full line) quantum numbers patterns of the pure inversion transitions pumped by a Q-branch are indicated on the top right plot.

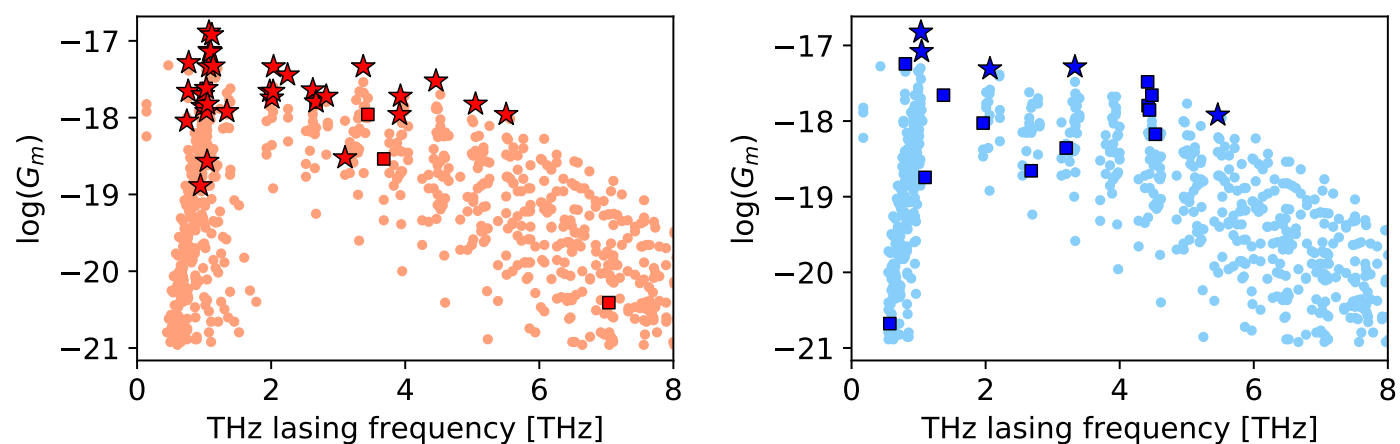


Figure S2: Molecular gain factor as a function of the THz lasing frequencies of $^{14}\text{NH}_3$ (left, in light red) and $^{15}\text{NH}_3$ (right, in light blue). The observed laser transitions in this work are highlighted by a star symbol (of the respective darker color). Lasing transitions previously reported for both species are indicated by squares (using the same color coding)

Table S3: Table of possible THz laser lines within the $\nu_2 = 1$ vibrational band of $^{14}\text{NH}_3$. An asterisk indicates a competition between possible emissions.

THz laser		IR pump											
Freq. [GHz]	QN	Freq. [cm ⁻¹]	P QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	Q QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	R QN	Pola.	G_m [u G_m]
140.1419	aR(1,1)	872.5671	aP(3,1)		1.5e-18	932.1362	aQ(2,1)	⊥	5.7e-19	971.8820	aR(1,1)		1.2e-18
446.5256	sQ(13,3)*	-	-	-	-	-	-	-	-	1212.8633	sR(12,3)	⊥	1.6e-21
466.2458	sP(1,0)	948.2320	sP(1,0)		4.8e-18	-	-	-	-	-	-	-	-
472.7172	sQ(13,4)*	-	-	-	-	-	-	-	-	1212.8300	sR(12,4)	⊥	1.6e-21
473.3056	sQ(14,6)*	-	-	-	-	-	-	-	-	1230.2321	sR(13,6)	⊥	2.4e-21
496.3563	sQ(12,2)*	-	-	-	-	-	-	-	-	1195.1930	sR(11,2)	⊥	1.2e-21
504.8735	sQ(13,5)*	-	-	-	-	-	-	-	-	1212.7480	sR(12,5)	⊥	2.7e-21
515.3808	sQ(12,3)*	-	-	-	-	-	-	-	-	1195.1336	sR(11,3)	⊥	5.6e-21
520.2789	sQ(14,7)*	-	-	-	-	-	-	-	-	1230.1397	sR(13,7)	⊥	1.9e-21
540.7765	sQ(12,4)*	-	-	-	-	-	-	-	-	1195.0464	sR(11,4)	⊥	5.3e-21
546.9373	sQ(13,6)*	688.4970	sP(14,6)	⊥	1.4e-21	959.7394	sQ(13,6)		1.7e-21	1212.6649	sR(12,6)	⊥	8.6e-21
561.4592	sQ(11,2)*	-	-	-	-	-	-	-	-	1177.1978	sR(10,2)	⊥	3.6e-21
561.9381	sQ(15,9)*	-	-	-	-	-	-	-	-	1247.3303	sR(14,9)	⊥	2.2e-21
577.3480	sQ(12,5)*	708.4153	sP(13,5)	⊥	1.6e-21	960.9520	sQ(12,5)		1.5e-21	1194.9762	sR(11,5)	⊥	8.9e-21
579.8942	sQ(14,8)*	-	-	-	-	-	-	-	-	1230.0694	sR(13,8)	⊥	2.8e-21
580.4775	sQ(11,3)*	728.8132	sP(12,3)	⊥	3.6e-21	962.2798	sQ(11,3)		1.2e-21	1177.1108	sR(10,3)	⊥	1.7e-20
600.8666	sQ(13,7)*	687.4722	sP(14,7)	⊥	1.1e-21	959.2030	sQ(13,7)		2.0e-21	1212.5951	sR(12,7)	⊥	6.6e-21
611.9772	sQ(11,4)*	728.3232	sP(12,4)	⊥	3.4e-21	962.0497	sQ(11,4)		2.1e-21	1177.0776	sR(10,4)	⊥	1.6e-20
615.0456	sQ(10,1)*	-	-	-	-	-	-	-	-	1159.0473	sR(9,1)	⊥	2.6e-21
625.1605	sQ(12,6)*	707.5927	sP(13,6)	⊥	5.2e-21	960.5182	sQ(12,6)		7.3e-21	1194.9111	sR(11,6)	⊥	2.8e-20
628.5864	sQ(10,2)*	748.5698	sP(11,2)	⊥	2.5e-21	-	-	-	-	1159.0258	sR(9,2)	⊥	1.0e-20
643.9029	sQ(15,10)*	-	-	-	-	-	-	-	-	1247.3221	sR(14,10)	⊥	1.7e-21
651.9892	sQ(10,3)*	748.2265	sP(11,3)	⊥	1.2e-20	963.0575	sQ(10,3)		4.3e-21	1158.9850	sR(9,3)	⊥	4.9e-20
653.1278	sQ(11,5)*	727.6892	sP(12,5)	⊥	5.7e-21	961.7134	sQ(11,5)		5.9e-21	1177.0212	sR(10,5)	⊥	2.7e-20
655.1437	sQ(14,9)*	665.9482	sP(15,9)	⊥	1.2e-21	957.0761	sQ(14,9)		4.0e-21	1230.0439	sR(13,9)	⊥	8.4e-21
669.2437	sQ(13,8)*	686.3134	sP(14,8)	⊥	1.6e-21	958.6177	sQ(13,8)		4.3e-21	1212.5581	sR(12,8)	⊥	9.8e-21
681.5026	sQ(9,1)*	768.3114	sP(10,1)	⊥	1.9e-21	-	-	-	-	1140.6997	sR(8,1)	⊥	6.8e-21
685.1681	sQ(10,4)*	747.7627	sP(11,4)	⊥	1.1e-20	962.7907	sQ(10,4)		7.7e-21	1158.9289	sR(9,4)	⊥	4.5e-20
686.4131	sQ(12,7)*	706.6404	sP(13,7)	⊥	4.0e-21	960.0325	sQ(12,7)		8.5e-21	1194.8679	sR(11,7)	⊥	2.1e-20
696.4339	sQ(9,2)*	768.1283	sP(10,2)	⊥	7.6e-21	963.9242	sQ(9,2)		1.4e-21	1140.6792	sR(8,2)	⊥	2.7e-20
706.8979	sQ(11,6)*	726.9295	sP(12,6)	⊥	1.8e-20	961.3224	sQ(11,6)		3.6e-20	1176.9767	sR(10,6)	⊥	8.4e-20
721.2642	sQ(9,3)*	767.8090	sP(10,3)	⊥	3.5e-20	963.7365	sQ(9,3)		1.5e-20	1140.6274	sR(8,3)	⊥	1.3e-19
730.9841	sQ(10,5)*	747.1812	sP(11,5)	⊥	1.8e-20	962.4890	sQ(10,5)		2.2e-20	1158.8875	sR(9,5)	⊥	7.3e-20
741.7881	aR(2,2)	852.7247	aP(4,2)		9.6e-19	932.0940	aQ(3,2)	⊥	1.0e-18	991.6905	aR(2,2)		9.0e-19
747.2868	sQ(8,1)*	788.0214	sP(9,1)	⊥	5.0e-21	-	-	-	-	1122.1784	sR(7,1)	⊥	1.6e-20
747.3440	sQ(15,11)*	-	-	-	-	954.5983	sQ(15,11)		1.7e-21	1247.4088	sR(14,11)	⊥	2.4e-21
747.5883	sQ(16,12)*	-	-	-	-	952.6967	sQ(16,12)		1.3e-21	1264.5198	sR(15,12)	⊥	1.8e-21
749.9338	sQ(14,10)*	-	-	-	-	956.3676	sQ(14,10)		4.2e-21	1230.0949	sR(13,10)	⊥	6.0e-21
755.4456	sQ(13,9)*	685.0379	sP(14,9)	⊥	4.8e-21	958.0058	sQ(13,9)		1.9e-20	1212.5810	sR(12,9)	⊥	2.8e-20
759.0008	sQ(9,4)*	767.3960	sP(10,4)	⊥	3.3e-20	963.5342	sQ(9,4)		2.7e-20	1140.6037	sR(8,4)	⊥	1.1e-19
762.8525	aR(2,1)	853.5482	aP(4,1)		1.8e-18	932.8812	aQ(3,1)	⊥	3.8e-19	992.4503	aR(2,1)		2.2e-18
763.5831	sQ(8,2)*	787.8547	sP(9,2)	⊥	2.2e-20	964.6096	sQ(8,2)		4.5e-21	1122.1600	sR(7,2)	⊥	6.6e-20
763.9947	sQ(12,8)*	705.5734	sP(13,8)	⊥	5.9e-21	959.5139	sQ(12,8)		1.9e-20	1194.8697	sR(11,8)	⊥	3.0e-20
769.7102	aR(2,0)	853.8178	aP(4,0)		4.1e-18	-	-	-	-	992.6987	aR(2,0)		5.2e-18
775.7261	sQ(11,7)*	726.0576	sP(12,7)	⊥	1.4e-20	960.8930	sQ(11,7)		3.6e-20	1176.9636	sR(10,7)	⊥	6.0e-20
790.8172	sQ(10,6)*	746.4900	sP(11,6)	⊥	5.7e-20	962.1444	sQ(10,6)		1.1e-19	1158.8655	sR(9,6)	⊥	2.2e-19
791.5310	sQ(8,3)*	787.5761	sP(9,3)	⊥	9.6e-20	964.4670	sQ(8,3)		5.0e-20	1122.1329	sR(7,3)	⊥	3.0e-19
809.4812	sQ(9,5)*	766.8705	sP(10,5)	⊥	5.4e-20	963.2691	sQ(9,5)		7.7e-20	1140.5780	sR(8,5)	⊥	1.8e-19

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Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
810.9190	sQ(7,1)*	807.8716	sP(8,1)	⊥	1.3e-20	-	-	-	-	1103.4858	sR(6,1)	⊥	3.7e-20
828.5256	sQ(7,2)*	807.7223	sP(8,2)	⊥	5.3e-20	965.2727	sQ(7,2)		1.4e-20	1103.4698	sR(6,2)	⊥	1.4e-19
831.9689	sQ(8,4)*	787.1989	sP(9,4)	⊥	8.8e-20	964.2685	sQ(8,4)		8.9e-20	1122.1040	sR(7,4)	⊥	2.6e-19
858.3951	sQ(7,3)*	807.4718	sP(8,3)	⊥	2.4e-19	965.1377	sQ(7,3)		1.6e-19	1103.4412	sR(6,3)	⊥	6.3e-19
861.6717	sQ(12,9)*	704.4141	sP(13,9)	⊥	1.7e-20	958.9893	sQ(12,9)		7.7e-20	1194.9479	sR(11,9)	⊥	8.1e-20
862.8099	sQ(11,8)*	725.0925	sP(12,8)	⊥	1.9e-20	960.4482	sQ(11,8)		7.0e-20	1177.0084	sR(10,8)	⊥	8.1e-20
863.8601	sQ(13,10)*	683.6716	sP(14,10)	⊥	3.4e-21	957.3989	sQ(13,10)		2.0e-20	1212.7013	sR(12,10)	⊥	1.9e-20
867.3425	sQ(10,7)*	745.7056	sP(11,7)	⊥	4.1e-20	961.7762	sQ(10,7)		1.3e-19	1158.8848	sR(9,7)	⊥	1.5e-19
869.3362	sQ(14,11)*	662.8663	sP(15,11)	⊥	1.3e-21	955.6767	sQ(14,11)		8.8e-21	1230.2667	sR(13,11)	⊥	8.2e-21
870.8782	sQ(6,1)*	827.8334	sP(7,1)	⊥	3.4e-20	965.9677	sQ(6,1)		2.5e-21	1084.6237	sR(5,1)	⊥	7.5e-20
875.3682	sQ(9,6)*	766.2525	sP(10,6)	⊥	1.6e-19	962.9736	sQ(9,6)		3.9e-19	1140.5792	sR(8,6)	⊥	5.0e-19
878.0883	sQ(15,12)*	-	-	-	-	953.8223	sQ(15,12)		7.3e-21	1247.6422	sR(14,12)	⊥	6.6e-21
887.0183	sQ(8,5)*	786.7323	sP(9,5)	⊥	1.4e-19	964.0412	sQ(8,5)		2.6e-19	1122.0937	sR(7,5)	⊥	3.9e-19
889.7112	sQ(6,2)*	827.7021	sP(7,2)	⊥	1.3e-19	965.8991	sQ(6,2)		4.3e-20	1084.6098	sR(5,2)	⊥	2.9e-19
890.1306	sQ(16,13)*	-	-	-	-	951.8355	sQ(16,13)		1.4e-21	1264.8260	sR(15,13)	⊥	1.3e-21
902.4589	sQ(7,4)*	807.1441	sP(8,4)	⊥	2.2e-19	964.9796	sQ(7,4)		2.8e-19	1103.4305	sR(6,4)	⊥	5.2e-19
921.9405	sQ(6,3)*	827.4878	sP(7,3)	⊥	5.8e-19	965.7913	sQ(6,3)		4.7e-19	1084.5931	sR(5,3)	⊥	1.2e-18
925.6582	sQ(5,1)*	847.8763	sP(6,1)	⊥	7.7e-20	966.5324	sQ(5,1)		7.5e-21	1065.5943	sR(4,1)	⊥	1.4e-19
945.6048	sQ(5,2)*	847.7629	sP(6,2)	⊥	3.0e-19	966.4736	sQ(5,2)		1.3e-19	1065.5817	sR(4,2)	⊥	5.3e-19
958.8279	sQ(8,6)*	786.1906	sP(9,6)	⊥	4.0e-19	963.7962	sQ(8,6)		1.3e-18	1122.1177	sR(7,6)	⊥	9.7e-19
959.5663	sQ(9,7)*	765.5612	sP(10,7)	⊥	1.1e-19	962.6698	sQ(9,7)		4.5e-19	1140.6320	sR(8,7)	⊥	3.1e-19
961.8846	sQ(7,5)*	806.7377	sP(8,5)	⊥	1.3e-19	964.7902	sQ(7,5)		8.0e-19	1103.4343	sR(6,5)	⊥	7.0e-19
964.0600	sQ(10,8)*	744.8509	sP(11,8)	⊥	5.5e-20	961.4110	sQ(10,8)		2.8e-19	1158.9758	sR(9,8)	⊥	1.8e-19
968.8093	sQ(6,4)*	827.2011	sP(7,4)	⊥	4.7e-19	965.6520	sQ(6,4)		8.5e-19	1084.5836	sR(5,4)	⊥	9.0e-19
972.3013	sQ(11,9)*	724.0613	sP(12,9)	⊥	5.2e-20	960.0199	sQ(11,9)		3.3e-19	1177.1477	sR(10,9)	⊥	1.9e-19
973.8268	sQ(4,1)*	867.9689	sP(5,1)	⊥	1.7e-19	967.0308	sQ(4,1)		2.2e-20	1046.4006	sR(3,1)	⊥	2.5e-19
979.6498	sQ(5,3)*	847.5781	sP(6,3)	⊥	1.2e-18	966.3799	sQ(5,3)		1.4e-18	1065.5654	sR(4,3)	⊥	2.0e-18
984.3138	sQ(12,10)*	703.1943	sP(13,10)	⊥	1.1e-20	958.4967	sQ(12,10)		7.9e-20	1195.1464	sR(11,10)	⊥	4.9e-20
994.7477	sQ(4,2)*	867.8729	sP(5,2)	⊥	6.1e-19	966.9810	sQ(4,2)		3.8e-19	1046.3880	sR(3,2)	⊥	8.5e-19
1000.1505	sQ(13,11)*	682.2518	sP(14,11)	⊥	4.6e-21	956.8418	sQ(13,11)		4.2e-20	1212.9709	sR(12,11)	⊥	2.3e-20
1014.0847	sQ(3,1)*	888.0794	sP(4,1)	⊥	3.4e-19	967.4491	sQ(3,1)		7.1e-20	1027.0470	sR(2,1)	⊥	4.1e-19
1019.8937	sQ(14,12)*	661.2358	sP(15,12)	⊥	3.6e-21	955.0557	sQ(14,12)		3.7e-20	1230.6204	sR(13,12)	⊥	2.0e-20
1029.3749	sQ(5,4)*	847.3376	sP(6,4)	⊥	9.1e-19	966.2692	sQ(5,4)		2.5e-18	1065.5638	sR(4,4)	⊥	1.1e-18
1030.5299	sQ(4,3)*	867.7196	sP(5,3)	⊥	2.3e-18	966.9051	sQ(4,3)		4.2e-18	1046.3746	sR(3,3)	⊥	2.4e-18
1032.3214	sQ(6,5)*	826.8553	sP(7,5)	⊥	6.5e-19	965.4994	sQ(6,5)		2.4e-18	1084.5992	sR(5,5)	⊥	9.1e-19
1035.8161	sQ(3,2)*	887.9998	sP(4,2)	⊥	1.1e-18	967.4068	sQ(3,2)		1.2e-18	1027.0329	sR(2,2)	⊥	1.1e-18
1039.3598	sQ(7,6)*	806.2742	sP(8,6)	⊥	8.0e-19	964.5957	sQ(7,6)		4.0e-18	1103.4795	sR(6,6)	⊥	1.3e-18
1043.6537	sQ(15,13)*	-	-	-	-	953.1392	sQ(15,13)		7.8e-21	1248.0943	sR(14,13)	⊥	4.2e-21
1045.3191	sQ(2,1)*	908.1768	sP(3,1)	⊥	6.9e-19	967.7747	sQ(2,1)		2.7e-19	1007.5405	sR(1,1)	⊥	5.7e-19
1050.5203	sQ(8,7)*	785.5963	sP(9,7)	⊥	2.4e-19	963.5585	sQ(8,7)		1.5e-18	1122.2036	sR(7,7)	⊥	4.5e-19
1065.8671	sQ(9,8)*	764.8236	sP(10,8)	⊥	1.3e-19	962.3884	sQ(9,8)		1.0e-18	1140.7706	sR(8,8)	⊥	2.8e-19
1066.6510	sQ(1,1)	928.2320	sP(2,1)	⊥	1.5e-18	967.9978	sQ(1,1)		1.8e-18	-	-	-	-
1067.6770	sQ(2,2)	908.1123	sP(3,2)	⊥	1.8e-18	967.7384	sQ(2,2)		4.6e-18	-	-	-	-
1071.5686	sQ(16,14)*	-	-	-	-	951.0932	sQ(16,14)		3.0e-21	1265.3922	sR(15,14)	⊥	1.6e-21
1073.0499	sQ(3,3)	887.8768	sP(4,3)	⊥	3.2e-18	967.3463	sQ(3,3)		1.3e-17	-	-	-	-
1082.5928	sQ(4,4)	867.5201	sP(5,4)	⊥	1.3e-18	966.8147	sQ(4,4)		7.5e-18	-	-	-	-
1085.4985	sQ(10,9)*	743.9582	sP(11,9)	⊥	1.3e-19	961.0860	sQ(10,9)		1.2e-18	1159.1800	sR(9,9)	⊥	3.2e-19
1096.5904	sQ(5,5)	847.0513	sP(6,5)	⊥	9.4e-19	966.1511	sQ(5,5)		7.2e-18	-	-	-	-
1103.8040	sQ(17,15)*	-	-	-	-	948.9188	sQ(17,15)		2.2e-21	1282.5140	sR(16,15)	⊥	1.2e-21

Continued on next page

Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [u G_m]
1109.5454	sQ(11,10)*	723.0027	sP(12,10)	⊥	3.1e-20	959.6524	sQ(11,10)		3.3e-19	1177.4315	sR(10,10)	⊥	8.7e-20
1115.0810	sQ(6,6)	826.4701	sP(7,6)	⊥	1.2e-18	965.3539	sQ(6,6)		1.2e-17	-	-	-	-
1138.1722	sQ(12,11)*	701.9597	sP(13,11)	⊥	1.4e-20	958.0888	sQ(12,11)		1.7e-19	1195.5251	sR(11,11)	⊥	4.5e-20
1138.2110	sQ(7,7)	805.7790	sP(8,7)	⊥	3.9e-19	964.4240	sQ(7,7)		4.7e-18	-	-	-	-
1166.1643	sQ(8,8)	784.9805	sP(9,8)	⊥	2.2e-19	963.3627	sQ(8,8)		3.3e-18	-	-	-	-
1171.5755	sQ(13,12)*	680.8321	sP(14,12)	⊥	1.1e-20	956.3968	sQ(13,12)		1.7e-19	1213.4613	sR(12,12)	⊥	4.3e-20
1199.1625	sQ(9,9)	764.0774	sP(10,9)	⊥	2.4e-19	962.1714	sQ(9,9)		4.4e-18	-	-	-	-
1209.9839	sQ(14,13)*	659.6231	sP(15,13)	⊥	2.2e-21	954.5783	sQ(14,13)		4.4e-20	1231.2408	sR(13,13)	⊥	9.6e-21
1237.4652	sQ(10,10)	743.0731	sP(11,10)	⊥	6.0e-20	960.8522	sQ(10,10)		1.3e-18	-	-	-	-
1253.6581	sQ(15,14)*	-	-	-	-	952.6354	sQ(15,14)		1.7e-20	1248.8648	sR(14,14)	⊥	4.0e-21
1281.3702	sQ(11,11)	721.9708	sP(12,11)	⊥	2.8e-20	959.4071	sQ(11,11)		7.2e-19	-	-	-	-
1302.8895	sQ(16,15)*	-	-	-	-	950.5708	sQ(16,15)		1.3e-20	1266.3350	sR(15,15)	⊥	3.2e-21
1331.2132	sQ(12,12)	700.7745	sP(13,12)	⊥	2.6e-20	957.8390	sQ(12,12)		7.5e-19	-	-	-	-
1338.6790	aR(3,3)	832.6348	aP(5,3)		1.1e-18	931.7736	aQ(4,3)	⊥	2.1e-18	1011.2036	aR(3,3)		1.2e-18
1358.0002	sQ(17,16)*	-	-	-	-	948.3876	sQ(17,16)		2.5e-21	-	-	-	-
1373.0488	aR(3,2)	834.0122	aP(5,2)		1.2e-18	933.0758	aQ(4,2)	⊥	7.3e-19	1012.4451	aR(3,2)		1.7e-18
1387.3677	sQ(13,13)	679.4885	sP(14,13)	⊥	5.4e-21	956.1510	sQ(13,13)		1.8e-19	-	-	-	-
1393.0785	aR(3,1)	834.8238	aP(5,1)		1.6e-18	933.8425	aQ(4,1)	⊥	2.1e-19	1013.1755	aR(3,1)		2.4e-18
1450.2437	sQ(14,14)	658.1175	sP(15,14)	⊥	2.2e-21	954.3469	sQ(14,14)		8.4e-20	-	-	-	-
1520.2868	sQ(15,15)	636.6669	sP(16,15)	⊥	1.6e-21	952.4311	sQ(15,15)		7.2e-20	-	-	-	-
1597.9758	sQ(16,16)	-	-	-	-	950.4086	sQ(16,16)		1.5e-20	-	-	-	-
1683.8197	sQ(17,17)	-	-	-	-	948.2853	sQ(17,17)		5.6e-21	-	-	-	-
1778.3533	sQ(18,18)	-	-	-	-	946.0679	sQ(18,18)		4.0e-21	-	-	-	-
1931.0487	aR(4,4)	812.3011	aP(6,4)		3.3e-19	931.1773	aQ(5,4)	⊥	9.0e-19	1030.4224	aR(4,4)		4.0e-19
1978.1120	aR(4,3)	814.2415	aP(6,3)		1.4e-18	932.9923	aQ(5,3)	⊥	1.6e-18	1032.1310	aR(4,3)		2.2e-18
2010.3707	aR(4,2)	815.5910	aP(6,2)		9.9e-19	934.2521	aQ(5,2)	⊥	4.4e-19	1033.3158	aR(4,2)		1.8e-18
2029.2006	aR(4,1)	816.3862	aP(6,1)		1.2e-18	934.9940	aQ(5,1)	⊥	1.2e-19	1034.0127	aR(4,1)		2.2e-18
2035.4532	aR(4,0)	816.6510	aP(6,0)		2.5e-18	-	-	-	-	1034.2448	aR(4,0)		4.6e-18
2244.4659	sR(1,0)	908.1991	sP(3,0)		3.7e-18	-	-	-	-	1007.5471	sR(1,0)		3.6e-18
2252.1120	sR(1,1)*	908.1768	sP(3,1)		1.3e-18	967.7747	sQ(2,1)	⊥	4.9e-19	1007.5405	sR(1,1)		1.0e-18
2518.6637	aR(5,5)	791.7268	aP(7,5)		1.7e-19	930.3066	aQ(6,5)	⊥	6.7e-19	1049.3464	aR(5,5)		2.5e-19
2578.1665	aR(5,4)	794.2441	aP(7,4)		3.7e-19	932.6357	aQ(6,4)	⊥	6.6e-19	1051.5120	aR(5,4)		7.0e-19
2622.0015	aR(5,3)	796.1341	aP(7,3)		1.1e-18	934.3796	aQ(6,3)	⊥	8.9e-19	1053.1305	aR(5,3)		2.3e-18
2651.9227	aR(5,2)	797.4477	aP(7,2)		6.1e-19	935.5916	aQ(6,2)	⊥	2.2e-19	1054.2527	aR(5,2)		1.4e-18
2669.4110	aR(5,1)	798.2222	aP(7,1)		7.4e-19	936.3048	aQ(6,1)	⊥	5.6e-20	1054.9126	aR(5,1)		1.6e-18
2822.2564	sR(2,1)*	888.0794	sP(4,1)		1.6e-18	967.4491	sQ(3,1)	⊥	3.3e-19	1027.0470	sR(2,1)		1.9e-18
2845.2812	sR(2,2)*	887.9998	sP(4,2)		8.2e-19	967.4068	sQ(3,2)		8.6e-19	1027.0329	sR(2,2)		7.7e-19
3101.5415	aR(6,6)	770.9138	aP(8,6)		1.8e-19	929.1617	aQ(7,6)	⊥	9.1e-19	1067.9744	aR(6,6)		3.0e-19
3173.2998	aR(6,5)	774.0253	aP(8,5)		1.9e-19	932.0112	aQ(7,5)	⊥	4.8e-19	1070.5910	aR(6,5)		4.1e-19
3228.0358	aR(6,4)	776.4616	aP(8,4)		2.6e-19	934.2357	aQ(7,4)	⊥	3.4e-19	1072.6274	aR(6,4)		6.6e-19
3268.2465	aR(6,3)	778.2899	aP(8,3)		6.2e-19	935.9037	aQ(7,3)	⊥	4.2e-19	1074.1492	aR(6,3)		1.7e-18
3295.7384	aR(6,2)	779.5640	aP(8,2)		3.5e-19	937.0593	aQ(7,2)	⊥	9.9e-20	1075.2032	aR(6,2)		9.8e-19
3311.7699	aR(6,1)	780.3141	aP(8,1)		3.9e-19	937.7404	aQ(7,1)	⊥	2.5e-20	1075.8229	aR(6,1)		1.1e-18
3317.2050	aR(6,0)	780.5677	aP(8,0)		7.2e-19	-	-	-	-	1076.0331	aR(6,0)		2.2e-18
3373.6128	sR(3,0)	868.0015	sP(5,0)		2.9e-18	-	-	-	-	1046.4055	sR(3,0)		4.6e-18
3380.9901	sR(3,1)*	867.9689	sP(5,1)		1.4e-18	967.0308	sQ(4,1)	⊥	1.9e-19	1046.4006	sR(3,1)		2.1e-18
3403.6125	sR(3,2)*	867.8729	sP(5,2)		1.0e-18	966.9810	sQ(4,2)	⊥	6.3e-19	1046.3880	sR(3,2)		1.4e-18
3442.2588	sR(3,3)*	867.7196	sP(5,3)		9.9e-19	966.9051	sQ(4,3)	⊥	1.8e-18	1046.3746	sR(3,3)		1.1e-18
3679.5915	aR(7,7)	749.8631	aP(9,7)		4.6e-20	927.7420	aQ(8,7)	⊥	2.9e-19	1086.3042	aR(7,7)		8.5e-20

Continued on next page

Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
3763.5615	aR(7,6)	753.5905	aP(9,6)		1.9e-19	931.1220	aQ(8,6)	⊥	6.2e-19	1089.3699	aR(7,6)		4.7e-19
3828.8208	aR(7,5)	756.5842	aP(9,5)		1.3e-19	933.8260	aQ(8,5)	⊥	2.4e-19	1091.8119	aR(7,5)		3.6e-19
3878.5013	aR(7,4)	758.9296	aP(9,4)		1.6e-19	935.9373	aQ(8,4)	⊥	1.6e-19	1093.7114	aR(7,4)		4.7e-19
3915.0670	aR(7,3)	760.6939	aP(9,3)		3.7e-19	937.5155	aQ(8,3)	⊥	1.8e-19	1095.1293	aR(7,3)		1.1e-18
3928.6856	sR(4,1)*	847.8763	sP(6,1)		1.0e-18	966.5324	sQ(5,1)	⊥	9.8e-20	1065.5943	sR(4,1)		1.9e-18
3939.7792	aR(7,2)	761.9181	aP(9,2)		2.0e-19	938.6175	aQ(8,2)	⊥	4.1e-20	1096.1128	aR(7,2)		5.9e-19
3950.7233	sR(4,2)*	847.7629	sP(6,2)		8.5e-19	966.4736	sQ(5,2)	⊥	3.6e-19	1065.5817	sR(4,2)		1.5e-18
3954.2658	aR(7,1)	762.6406	aP(9,1)		2.0e-19	939.2636	aQ(8,1)	⊥	1.0e-20	1096.6898	aR(7,1)		6.0e-19
3988.2917	sR(4,3)*	847.5781	sP(6,3)		1.2e-18	966.3799	sQ(5,3)	⊥	1.4e-18	1065.5654	sR(4,3)		1.9e-18
4043.0164	sR(4,4)*	847.3376	sP(6,4)		2.8e-19	966.2692	sQ(5,4)	⊥	7.7e-19	1065.5638	sR(4,4)		3.5e-19
4252.6877	aR(8,8)	728.5745	aP(10,8)		2.2e-20	926.0457	aQ(9,8)	⊥	1.6e-19	1104.3325	aR(8,8)		4.6e-20
4348.9638	aR(8,7)	732.9436	aP(10,7)		4.4e-20	929.9705	aQ(9,7)	⊥	1.8e-19	1107.8494	aR(8,7)		1.2e-19
4424.4522	aR(8,6)	736.5090	aP(10,6)		1.2e-19	933.1574	aQ(9,6)	⊥	2.9e-19	1110.6889	aR(8,6)		3.9e-19
4458.8750	sR(5,0)	827.8777	sP(7,0)		1.3e-18	-	-	-	-	1084.6290	sR(5,0)		3.0e-18
4465.9475	sR(5,1)*	827.8334	sP(7,1)		6.4e-19	965.9677	sQ(6,1)	⊥	4.8e-20	1084.6237	sR(5,1)		1.4e-18
4482.9601	aR(8,5)	739.3747	aP(10,5)		7.3e-20	935.7074	aQ(9,5)	⊥	1.0e-19	1112.9492	aR(8,5)		2.4e-19
4487.2388	sR(5,2)*	827.7021	sP(7,2)		5.6e-19	965.8991	sQ(6,2)	⊥	1.9e-19	1084.6098	sR(5,2)		1.3e-18
4523.5918	sR(5,3)*	827.4878	sP(7,3)		9.5e-19	965.7913	sQ(6,3)	⊥	7.7e-19	1084.5931	sR(5,3)		2.0e-18
4527.3979	aR(8,4)	741.6214	aP(10,4)		8.1e-20	937.6988	aQ(9,4)	⊥	6.4e-20	1114.7065	aR(8,4)		2.7e-19
4559.8907	aR(8,3)	743.3067	aP(10,3)		1.7e-19	939.1981	aQ(9,3)	⊥	7.2e-20	1116.0197	aR(8,3)		6.1e-19
4576.3508	sR(5,4)*	827.2011	sP(7,4)		3.2e-19	965.6520	sQ(6,4)	⊥	5.7e-19	1084.5836	sR(5,4)		6.1e-19
4581.9994	aR(8,2)	744.4863	aP(10,2)		8.8e-20	940.2276	aQ(9,2)	⊥	1.6e-20	1116.9269	aR(8,2)		3.0e-19
4594.8800	aR(8,1)	745.1781	aP(10,1)		8.9e-20	940.8361	aQ(9,1)	⊥	3.9e-21	1117.4591	aR(8,1)		3.0e-19
4599.4936	aR(8,0)	745.4199	aP(10,0)		1.8e-19	-	-	-	-	1117.6478	aR(8,0)		6.4e-19
4647.5756	sR(5,5)*	826.8553	sP(7,5)		1.5e-19	965.4994	sQ(6,5)	⊥	5.8e-19	1084.5992	sR(5,5)		2.2e-19
4820.6691	aR(9,9)	707.0470	aP(11,9)		1.9e-20	924.0703	aQ(10,9)	⊥	1.7e-19	1122.0551	aR(9,9)		4.7e-20
4929.4840	aR(9,8)	712.0875	aP(11,8)		1.9e-20	928.5579	aQ(10,8)	⊥	9.3e-20	1126.0291	aR(9,8)		6.0e-20
4993.5672	sR(6,1)*	807.8716	sP(8,1)		3.4e-19	965.3515	sQ(7,1)	⊥	2.2e-20	1103.4858	sR(6,1)		9.4e-19
5013.9753	sR(6,2)*	807.7223	sP(8,2)		3.2e-19	965.2727	sQ(7,2)	⊥	8.6e-20	1103.4698	sR(6,2)		8.7e-19
5015.0349	aR(9,7)	716.2427	aP(11,7)		2.6e-20	932.2348	aQ(10,7)	⊥	8.0e-20	1129.2617	aR(9,7)		9.2e-20
5048.5821	sR(6,3)*	807.4718	sP(8,3)		5.6e-19	965.1377	sQ(7,3)	⊥	3.7e-19	1103.4412	sR(6,3)		1.5e-18
5081.8731	aR(9,6)	719.6367	aP(11,6)		6.1e-20	935.2212	aQ(10,6)	⊥	1.2e-19	1131.8696	aR(9,6)		2.2e-19
5099.3040	sR(6,4)*	807.1441	sP(8,4)		2.5e-19	964.9796	sQ(7,4)	⊥	3.1e-19	1103.4305	sR(6,4)		5.8e-19
5133.5090	aR(9,5)	722.3671	aP(11,5)		3.3e-20	937.6115	aQ(10,5)	⊥	3.9e-20	1133.9442	aR(9,5)		1.3e-19
5167.5058	sR(6,5)*	806.7377	sP(8,5)		6.9e-20	964.7902	sQ(7,5)	⊥	4.1e-19	1103.4343	sR(6,5)		3.6e-19
5172.6190	aR(9,4)	724.5095	aP(11,4)		3.4e-20	939.4790	aQ(10,4)	⊥	2.4e-20	1135.5564	aR(9,4)		1.4e-19
5201.4139	aR(9,3)	726.1270	aP(11,3)		7.0e-20	940.8659	aQ(10,3)	⊥	2.6e-20	1136.7574	aR(9,3)		2.7e-19
5220.4105	aR(9,2)	727.2435	aP(11,2)		3.6e-20	941.8509	aQ(10,2)	⊥	5.5e-21	1137.5922	aR(9,2)		1.4e-19
5231.6477	aR(9,1)	727.9019	aP(11,1)		3.6e-20	942.4195	aQ(10,1)	⊥	1.3e-21	1138.0776	aR(9,1)		1.4e-19
5255.9823	sR(6,6)*	806.2742	sP(8,6)		1.6e-19	964.5957	sQ(7,6)	⊥	7.8e-19	1103.4795	sR(6,6)		2.6e-19
5383.3395	aR(10,10)	685.2787	aP(12,10)		4.1e-21	921.8120	aQ(11,10)	⊥	4.5e-20	1139.4669	aR(10,10)		1.2e-20
5505.0656	aR(10,9)	691.0242	aP(12,9)		1.6e-20	926.8846	aQ(11,9)	⊥	9.4e-20	1143.9078	aR(10,9)		5.7e-20
5505.9143	sR(7,0)	788.0777	sP(9,0)		3.3e-19	-	-	-	-	1122.1853	sR(7,0)		1.1e-18
5512.4717	sR(7,1)*	788.0214	sP(9,1)		1.7e-19	964.6985	sQ(8,1)	⊥	9.0e-21	1122.1784	sR(7,1)		5.5e-19
5531.8880	sR(7,2)*	787.8547	sP(9,2)		1.7e-19	964.6096	sQ(8,2)	⊥	3.6e-20	1122.1600	sR(7,2)		5.2e-19
5564.9930	sR(7,3)*	787.5761	sP(9,3)		3.1e-19	964.4670	sQ(8,3)	⊥	1.6e-19	1122.1329	sR(7,3)		9.6e-19
5600.6372	aR(10,8)	695.7908	aP(12,8)		1.0e-20	931.0622	aQ(11,8)	⊥	4.1e-20	1147.5326	aR(10,8)		4.3e-20
5612.9291	sR(7,4)*	787.1989	sP(9,4)		1.4e-19	964.2685	sQ(8,4)	⊥	1.4e-19	1122.1040	sR(7,4)		4.1e-19
5675.4304	aR(10,7)	699.7245	aP(12,7)		1.2e-20	934.4861	aQ(11,7)	⊥	2.9e-20	1150.4782	aR(10,7)		5.2e-20

Continued on next page

Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
5677.7236	sR(7,5)*	786.7323	sP(9,5)		1.1e-19	964.0412	sQ(8,5)	⊥	2.1e-19	1122.0937	sR(7,5)		3.2e-19
5733.6126	aR(10,6)	702.9413	aP(12,6)		2.5e-20	937.2683	aQ(11,6)	⊥	3.9e-20	1152.8527	aR(10,6)		1.1e-19
5761.7491	sR(7,6)*	786.1906	sP(9,6)		1.6e-19	963.7962	sQ(8,6)	⊥	5.3e-19	1122.1177	sR(7,6)		4.0e-19
5778.3853	aR(10,5)	705.5318	aP(12,5)		1.3e-20	939.4963	aQ(11,5)	⊥	1.3e-20	1154.7407	aR(10,5)		6.0e-20
5812.1831	aR(10,4)	707.5665	aP(12,4)		1.3e-20	941.2378	aQ(11,4)	⊥	7.9e-21	1156.2073	aR(10,4)		6.0e-20
5836.6795	aR(10,3)	709.0891	aP(12,3)		2.6e-20	942.5657	aQ(11,3)	⊥	8.4e-21	1157.3046	aR(10,3)		1.2e-19
5853.1391	aR(10,2)	710.1655	aP(12,2)		1.3e-20	943.4506	aQ(11,2)	⊥	1.8e-21	1158.0580	aR(10,2)		6.0e-20
5862.7103	aR(10,1)	710.7871	aP(12,1)		1.3e-20	-	-	-	-	1158.4942	aR(10,1)		6.1e-20
5866.6796	aR(10,0)	711.0215	aP(12,0)		2.6e-20	-	-	-	-	1158.6670	aR(10,0)		1.2e-19
5868.3228	sR(7,7)*	785.5963	sP(9,7)		3.8e-20	963.5585	sQ(8,7)	⊥	2.4e-19	1122.2036	sR(7,7)		7.3e-20
5940.4679	aR(11,11)	663.2666	aP(13,11)		1.6e-21	919.2664	aQ(12,11)	⊥	2.1e-20	1156.5620	aR(11,11)		5.2e-21
6023.6695	sR(8,1)*	768.3114	sP(10,1)		7.9e-20	964.0226	sQ(9,1)	⊥	3.4e-21	1140.6997	sR(8,1)		2.9e-19
6042.0165	sR(8,2)*	768.1283	sP(10,2)		7.8e-20	963.9242	sQ(9,2)	⊥	1.4e-20	1140.6792	sR(8,2)		2.8e-19
6072.6859	sR(8,3)*	767.8090	sP(10,3)		1.5e-19	963.7365	sQ(9,3)	⊥	6.4e-20	1140.6274	sR(8,3)		5.3e-19
6075.6190	aR(11,10)	669.7548	aP(13,10)		3.0e-21	924.9500	aQ(12,10)	⊥	2.2e-20	1161.4833	aR(11,10)		1.3e-20
6118.3675	sR(8,4)*	767.3960	sP(10,4)		7.1e-20	963.5342	sQ(9,4)	⊥	5.8e-20	1140.6037	sR(8,4)		2.4e-19
6179.4596	sR(8,5)*	766.8705	sP(10,5)		6.4e-20	963.2691	sQ(9,5)	⊥	9.1e-20	1140.5780	sR(8,5)		2.1e-19
6181.2928	aR(11,9)	675.1577	aP(13,9)		7.9e-21	929.6424	aQ(12,9)	⊥	3.8e-20	1165.5028	aR(11,9)		3.7e-20
6258.6483	sR(8,6)*	766.2525	sP(10,6)		1.1e-19	962.9736	sQ(9,6)	⊥	2.6e-19	1140.5792	sR(8,6)		3.3e-19
6263.7823	aR(11,8)	679.6458	aP(13,8)		4.4e-21	933.5083	aQ(12,8)	⊥	1.4e-20	1168.7797	aR(11,8)		2.1e-20
6327.9786	aR(11,7)	683.3547	aP(13,7)		4.6e-21	936.6786	aQ(12,7)	⊥	9.7e-21	1171.4402	aR(11,7)		2.3e-20
6359.0503	sR(8,7)*	765.5612	sP(10,7)		3.8e-20	962.6698	sQ(9,7)	⊥	1.6e-19	1140.6320	sR(8,7)		1.1e-19
6377.6542	aR(11,6)	686.3918	aP(13,6)		9.2e-21	939.2565	aQ(12,6)	⊥	1.3e-20	1173.5835	aR(11,6)		4.7e-20
6415.6953	aR(11,5)	688.8409	aP(13,5)		4.5e-21	941.3224	aQ(12,5)	⊥	4.1e-21	1175.2869	aR(11,5)		2.4e-20
6444.2900	aR(11,4)	690.7667	aP(13,4)		4.4e-21	942.9382	aQ(12,4)	⊥	2.4e-21	1176.6095	aR(11,4)		2.4e-20
6465.3995	aR(11,3)	692.2313	aP(13,3)		8.7e-21	944.1142	aQ(12,3)	⊥	2.5e-21	1177.5909	aR(11,3)		4.6e-20
6478.4720	aR(11,2)	693.2290	aP(13,2)		4.3e-21	-	-	-	-	1178.2775	aR(11,2)		2.2e-20
6484.7191	sR(8,8)*	764.8236	sP(10,8)		1.8e-20	962.3884	sQ(9,8)	⊥	1.4e-19	1140.7706	sR(8,8)		3.9e-20
6486.3456	aR(11,1)	693.8091	aP(13,1)		4.2e-21	-	-	-	-	1178.6606	aR(11,1)		2.2e-20
6491.7883	aR(12,12)	641.0069	aP(14,12)		1.2e-21	916.4282	aQ(13,12)	⊥	1.8e-20	1173.3335	aR(12,12)		4.5e-21
6522.1586	sR(9,0)	748.8344	sP(11,0)		6.4e-20	-	-	-	-	1159.0561	sR(9,0)		2.7e-19
6528.1959	sR(9,1)*	748.7672	sP(11,1)		3.2e-20	963.3361	sQ(10,1)	⊥	1.2e-21	1159.0473	sR(9,1)		1.3e-19
6545.4309	sR(9,2)*	748.5698	sP(11,2)		3.2e-20	963.2298	sQ(10,2)	⊥	4.9e-21	1159.0258	sR(9,2)		1.3e-19
6574.6673	sR(9,3)*	748.2265	sP(11,3)		6.3e-20	963.0575	sQ(10,3)	⊥	2.3e-20	1158.9850	sR(9,3)		2.6e-19
6616.7879	sR(9,4)*	747.7627	sP(11,4)		3.1e-20	962.7907	sQ(10,4)	⊥	2.1e-20	1158.9289	sR(9,4)		1.2e-19
6641.0229	aR(12,11)	648.2795	aP(14,11)		1.1e-21	922.7526	aQ(13,11)	⊥	1.0e-20	1178.7524	aR(12,11)		5.4e-21
6673.9742	sR(9,5)*	747.1812	sP(11,5)		2.9e-20	962.4890	sQ(10,5)	⊥	3.5e-20	1158.8875	sR(9,5)		1.2e-19
6748.0585	sR(9,6)*	746.4900	sP(11,6)		5.3e-20	962.1444	sQ(10,6)	⊥	1.0e-19	1158.8655	sR(9,6)		2.0e-19
6757.0027	aR(12,10)	654.3471	aP(14,10)		1.4e-21	927.9773	aQ(13,10)	⊥	8.1e-21	1183.1725	aR(12,10)		7.8e-21
6841.9437	sR(9,7)*	745.7056	sP(11,7)		2.2e-20	961.7762	sQ(10,7)	⊥	6.9e-20	1158.8848	sR(9,7)		8.2e-20
6847.0416	aR(12,9)	659.4070	aP(14,9)		3.1e-21	932.2927	aQ(13,9)	⊥	1.2e-20	1186.7774	aR(12,9)		1.8e-20
6916.8315	aR(12,8)	663.6170	aP(14,8)		1.6e-21	935.8505	aQ(13,8)	⊥	4.2e-21	1189.7131	aR(12,8)		9.3e-21
6959.4111	sR(9,8)*	744.8509	sP(11,8)		1.6e-20	961.4110	sQ(10,8)	⊥	8.2e-20	1158.9758	sR(9,8)		5.3e-20
6970.7699	aR(12,7)	667.1021	aP(14,7)		1.5e-21	938.7708	aQ(13,7)	⊥	2.8e-21	1192.0947	aR(12,7)		9.5e-21
7012.2303	aR(12,6)	669.9607	aP(14,6)		3.0e-21	941.1477	aQ(13,6)	⊥	3.6e-21	1194.0124	aR(12,6)		1.8e-20
7027.0623	sR(10,1)*	729.4113	sP(12,1)		1.2e-20	-	-	-	-	1177.2180	sR(10,1)		5.5e-20
7036.9995	aR(13,13)	-	-	-	-	913.2912	aQ(14,13)	⊥	3.9e-21	-	-	-	-
7043.1848	sR(10,2)*	729.2030	sP(12,2)		1.2e-20	962.5378	sQ(11,2)	⊥	1.6e-21	1177.1978	sR(10,2)		5.5e-20
7043.7816	aR(12,5)	672.2694	aP(14,5)		1.4e-21	943.0544	aQ(13,5)	⊥	1.1e-21	1195.5359	aR(12,5)		9.0e-21

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Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	Freq. [cm ⁻¹]	P QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	Q QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	R QN	Pola.	G_m [u G_m]
7067.3660	aR(12,4)	674.0872	aP(14,4)		1.4e-21	-	-	-	-	1196.7185	aR(12,4)		8.3e-21
7069.1462	sR(10,3)*	728.8132	sP(12,3)		2.3e-20	962.2798	sQ(11,3)	⊥	7.6e-21	1177.1108	sR(10,3)		1.1e-19
7084.1507	aR(12,3)	675.4389	aP(14,3)		2.6e-21	-	-	-	-	1197.6073	aR(12,3)		1.6e-20
7094.8740	aR(12,2)	676.4138	aP(14,2)		1.3e-21	-	-	-	-	1198.2085	aR(12,2)		7.7e-21
7100.9245	aR(12,1)	676.9419	aP(14,1)		1.2e-21	-	-	-	-	1198.5292	aR(12,1)		7.3e-21
7104.9681	aR(12,0)	677.1906	aP(14,0)		2.5e-21	-	-	-	-	1198.7089	aR(12,0)		1.4e-20
7105.3300	sR(9,9)*	743.9582	sP(11,9)		1.6e-20	961.0860	sQ(10,9)	⊥	1.5e-19	1159.1800	sR(9,9)		4.0e-20
7109.3284	sR(10,4)*	728.3232	sP(12,4)		1.2e-20	962.0497	sQ(11,4)	⊥	7.1e-21	1177.0776	sR(10,4)		5.6e-20
7162.4972	sR(10,5)*	727.6892	sP(12,5)		1.2e-20	961.7134	sQ(11,5)	⊥	1.2e-20	1177.0212	sR(10,5)		5.4e-20
7201.1238	aR(13,12)	-	-	-	-	920.2901	aQ(14,12)	⊥	8.2e-21	1195.7113	aR(13,12)		4.4e-21
7231.3277	sR(10,6)*	726.9295	sP(12,6)		2.2e-20	961.3224	sQ(11,6)	⊥	4.5e-20	1176.9767	sR(10,6)		1.0e-19
7318.4990	sR(10,7)*	726.0576	sP(12,7)		1.0e-20	960.8930	sQ(11,7)	⊥	2.7e-20	1176.9636	sR(10,7)		4.6e-20
7327.7365	aR(13,11)	-	-	-	-	926.0679	aQ(14,11)	⊥	3.3e-21	1200.5410	aR(13,11)		3.0e-21
7425.2864	aR(13,10)	-	-	-	-	930.8432	aQ(14,10)	⊥	2.4e-21	1204.4735	aR(13,10)		3.4e-21
7427.5070	sR(10,8)*	725.0925	sP(12,8)		9.0e-21	960.4482	sQ(11,8)	⊥	3.3e-20	1177.0084	sR(10,8)		3.8e-20
7500.3542	aR(13,9)	643.7362	aP(15,9)		1.0e-21	934.7908	aQ(14,9)	⊥	3.3e-21	1207.6766	aR(13,9)		7.0e-21
7515.5306	sR(11,0)	710.3386	sP(13,0)		7.6e-21	-	-	-	-	1195.2169	sR(11,0)		4.2e-20
7521.2162	sR(11,1)*	710.2623	sP(13,1)		3.8e-21	-	-	-	-	1195.2069	sR(11,1)		2.1e-20
7536.2875	sR(11,2)*	710.0490	sP(13,2)		3.8e-21	-	-	-	-	1195.1930	sR(11,2)		2.1e-20
7558.0250	aR(13,8)	-	-	-	-	938.0491	aQ(14,8)	⊥	1.1e-21	1210.2827	aR(13,8)		3.4e-21
7561.2578	sR(11,3)*	709.6374	sP(13,3)		7.8e-21	961.6669	sQ(12,3)	⊥	2.3e-21	1195.1336	sR(11,3)		4.4e-20
7562.8654	sR(10,9)*	724.0613	sP(12,9)		1.3e-20	960.0199	sQ(11,9)	⊥	8.4e-20	1177.1477	sR(10,9)		5.0e-20
7575.7651	aR(14,14)	-	-	-	-	909.8484	aQ(15,14)	⊥	1.5e-21	-	-	-	-
7597.0436	sR(11,4)*	709.0973	sP(13,4)		4.0e-21	961.3199	sQ(12,4)	⊥	2.2e-21	1195.0464	sR(11,4)		2.2e-20
7602.2015	aR(13,7)	-	-	-	-	-	-	-	-	1212.3957	aR(13,7)		3.2e-21
7635.8598	aR(13,6)	-	-	-	-	-	-	-	-	1214.0965	aR(13,6)		6.2e-21
7646.1710	sR(11,5)*	708.4153	sP(13,5)		4.1e-21	960.9520	sQ(12,5)	⊥	3.6e-21	1194.9762	sR(11,5)		2.2e-20
7661.2562	aR(13,5)	-	-	-	-	-	-	-	-	1215.4472	aR(13,5)		2.9e-21
7680.0916	aR(13,4)	-	-	-	-	-	-	-	-	1216.4954	aR(13,4)		2.8e-21
7694.0989	aR(13,3)	-	-	-	-	-	-	-	-	1217.2664	aR(13,3)		5.3e-21
7700.9284	aR(13,2)	-	-	-	-	-	-	-	-	1217.8144	aR(13,2)		2.5e-21
7704.4656	aR(13,1)	-	-	-	-	-	-	-	-	1218.0381	aR(13,1)		2.3e-21
7709.7126	sR(11,6)*	707.5927	sP(13,6)		8.2e-21	960.5182	sQ(12,6)	⊥	1.1e-20	1194.9111	sR(11,6)		4.4e-20
7730.3501	sR(10,10)*	723.0027	sP(12,10)		3.4e-21	959.6524	sQ(11,10)	⊥	3.7e-20	1177.4315	sR(10,10)		9.6e-21
7755.7370	aR(14,13)	-	-	-	-	917.5593	aQ(15,13)	⊥	1.6e-21	-	-	-	-
7790.1177	sR(11,7)*	706.6404	sP(13,7)		4.1e-21	960.0325	sQ(12,7)	⊥	8.6e-21	1194.8679	sR(11,7)		2.1e-20
7890.5869	sR(11,8)*	705.5734	sP(13,8)		3.9e-21	959.5139	sQ(12,8)	⊥	1.2e-20	1194.8697	sR(11,8)		2.0e-20
7893.4338	aR(14,12)	-	-	-	-	923.9142	aQ(15,12)	⊥	2.5e-21	1217.6067	aR(14,12)		2.2e-21
7998.5631	aR(14,11)	-	-	-	-	-	-	-	-	1221.8692	aR(14,11)		1.2e-21
8011.5226	sR(12,1)*	691.3353	sP(14,1)		1.1e-21	-	-	-	-	1213.0081	sR(12,1)		7.3e-21
8015.2658	sR(11,9)*	704.4141	sP(13,9)		6.8e-21	958.9893	sQ(12,9)	⊥	3.1e-20	1194.9479	sR(11,9)		3.3e-20
8025.7455	sR(12,2)*	691.1292	sP(14,2)		1.1e-21	-	-	-	-	1213.0116	sR(12,2)		7.3e-21
8046.0571	sR(12,3)*	690.6559	sP(14,3)		2.4e-21	-	-	-	-	1212.8633	sR(12,3)		1.5e-20
8078.6916	aR(14,10)	-	-	-	-	-	-	-	-	1225.3345	aR(14,10)		1.2e-21
8080.8596	sR(12,4)*	690.1011	sP(14,4)		1.2e-21	-	-	-	-	1212.8300	sR(12,4)		7.8e-21
8107.7133	aR(15,15)	-	-	-	-	906.0924	aQ(16,15)	⊥	1.1e-21	-	-	-	-
8126.0032	sR(12,5)*	689.3760	sP(14,5)		1.3e-21	960.2113	sQ(13,5)	⊥	1.0e-21	1212.7480	sR(12,5)		8.1e-21
8139.6645	aR(14,9)	-	-	-	-	-	-	-	-	1228.1541	aR(14,9)		2.3e-21
8169.4783	sR(11,10)*	703.1943	sP(13,10)		2.6e-21	958.4967	sQ(12,10)	⊥	1.8e-20	1195.1464	sR(11,10)		1.1e-20

Continued on next page

Table S3 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
8184.3282	sR(12,6)*	688.4970	sP(14,6)		2.7e-21	959.7394	sQ(13,6)	⊥	3.3e-21	1212.6649	sR(12,6)		1.7e-20
8185.9627	aR(14,8)	-	-	-	-	-	-	-	-	1230.4466	aR(14,8)		1.1e-21
8247.3648	aR(14,6)	-	-	-	-	-	-	-	-	1233.7997	aR(14,6)		1.8e-21
8258.0496	sR(12,7)*	687.4722	sP(14,7)		1.4e-21	959.2030	sQ(13,7)	⊥	2.5e-21	1212.5951	sR(12,7)		8.5e-21
8291.2086	aR(14,3)	-	-	-	-	-	-	-	-	1236.6066	aR(14,3)		1.5e-21
8303.7559	aR(14,0)	-	-	-	-	-	-	-	-	1237.4630	aR(14,0)		1.4e-21
8350.0699	sR(12,8)*	686.3134	sP(14,8)		1.4e-21	958.6177	sQ(13,8)	⊥	3.7e-21	1212.5581	sR(12,8)		8.4e-21
8360.0103	sR(11,11)*	701.9597	sP(13,11)		1.4e-21	958.0888	sQ(12,11)	⊥	1.7e-20	1195.5251	sR(11,11)		4.4e-21
8464.1588	sR(12,9)*	685.0379	sP(14,9)		2.7e-21	958.0058	sQ(13,9)	⊥	1.1e-20	1212.5810	sR(12,9)		1.6e-20
8492.7876	sR(13,0)	-	-	-	-	-	-	-	-	1230.6237	sR(13,0)		4.6e-21
8498.8176	sR(13,1)*	-	-	-	-	-	-	-	-	1230.6137	sR(13,1)		2.3e-21
8512.9978	sR(13,2)*	-	-	-	-	-	-	-	-	1230.6716	sR(13,2)		2.1e-21
8532.1772	sR(13,3)*	-	-	-	-	-	-	-	-	1230.5420	sR(13,3)		4.8e-21
8561.5401	sR(13,4)*	-	-	-	-	-	-	-	-	1230.4215	sR(13,4)		2.5e-21
8602.8291	sR(13,5)*	-	-	-	-	-	-	-	-	1230.3300	sR(13,5)		2.6e-21
8605.1766	sR(12,10)*	683.6716	sP(14,10)		1.2e-21	957.3989	sQ(13,10)	⊥	7.1e-21	1212.7013	sR(12,10)		6.8e-21
8656.1027	sR(13,6)*	-	-	-	-	-	-	-	-	1230.2321	sR(13,6)		5.6e-21
8723.3469	sR(13,7)*	-	-	-	-	-	-	-	-	1230.1397	sR(13,7)		2.9e-21
8779.3456	sR(12,11)*	-	-	-	-	956.8418	sQ(13,11)	⊥	8.6e-21	1212.9709	sR(12,11)		4.7e-21
8807.1629	sR(13,8)*	-	-	-	-	-	-	-	-	1230.0694	sR(13,8)		3.0e-21
8910.9435	sR(13,9)*	-	-	-	-	957.0761	sQ(14,9)	⊥	2.9e-21	1230.0439	sR(13,9)		6.2e-21
8994.5770	sR(12,12)*	680.8321	sP(14,12)		1.0e-21	956.3968	sQ(13,12)	⊥	1.6e-20	1213.4613	sR(12,12)		3.9e-21
9009.6303	sR(14,3)*	-	-	-	-	-	-	-	-	1247.8324	sR(14,3)		1.4e-21
9039.0803	sR(13,10)*	-	-	-	-	956.3676	sQ(14,10)	⊥	2.1e-21	1230.0949	sR(13,10)		3.0e-21
9125.7588	sR(14,6)*	-	-	-	-	-	-	-	-	1247.6044	sR(14,6)		1.7e-21
9197.2232	sR(13,11)*	-	-	-	-	955.6767	sQ(14,11)	⊥	2.8e-21	1230.2667	sR(13,11)		2.6e-21
9356.7463	sR(14,9)*	-	-	-	-	-	-	-	-	1247.3303	sR(14,9)		2.1e-21
9392.5929	sR(13,12)*	-	-	-	-	955.0557	sQ(14,12)	⊥	7.0e-21	1230.6204	sR(13,12)		3.8e-21
9472.5283	sR(14,10)*	-	-	-	-	-	-	-	-	1247.3221	sR(14,10)		1.1e-21
9615.2434	sR(14,11)*	-	-	-	-	-	-	-	-	1247.4088	sR(14,11)		1.1e-21
9634.3511	sR(13,13)*	-	-	-	-	954.5783	sQ(14,13)	⊥	3.6e-21	-	-	-	-
9791.4158	sR(14,12)*	-	-	-	-	953.8223	sQ(15,12)	⊥	2.1e-21	1247.6422	sR(14,12)		1.9e-21
10009.3750	sR(14,13)*	-	-	-	-	953.1392	sQ(15,13)	⊥	1.3e-21	-	-	-	-

Table S4: Table of possible THz laser lines within the ν_2 vibrational band of $^{15}\text{NH}_3$. An asterisk indicates a competition between possible emissions.

THz laser		IR pump											
Freq. [GHz]	QN	Freq. [cm ⁻¹]	P QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	Q QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	R QN	Pola.	G_m [uG _m]
175.0545	aR(1,1)	868.7867	aP(3,1)		1.5e-18	928.2105	aQ(2,1)	⊥	6.0e-19	967.8597	aR(1,1)		1.3e-18
430.0409	sP(1,0)	943.0531	sP(1,0)		5.3e-18	-	-	-	-	-	-	-	-
548.7980	sQ(12,5)*	704.4714	sP(13,5)	⊥	1.8e-21	956.3615	sQ(12,5)		1.6e-21	1189.7912	sR(11,5)	⊥	1.0e-20
550.6156	sQ(14,8)*	-	-	-	-	953.2363	sQ(14,8)		1.0e-21	1224.8482	sR(13,8)	⊥	3.2e-21
552.1314	sQ(11,3)*	724.7878	sP(12,3)	⊥	4.0e-21	957.6577	sQ(11,3)		1.3e-21	1171.9433	sR(10,3)	⊥	1.9e-20
582.6811	sQ(11,4)*	724.2631	sP(12,4)	⊥	3.8e-21	957.3935	sQ(11,4)		2.3e-21	1171.8773	sR(10,4)	⊥	1.8e-20
585.9483	sQ(10,1)*	-	-	-	-	-	-	-	-	1153.8665	sR(9,1)	⊥	2.9e-21
595.1696	sQ(12,6)*	703.5964	sP(13,6)	⊥	5.8e-21	955.8772	sQ(12,6)		8.2e-21	1189.6771	sR(11,6)	⊥	3.2e-20
599.0989	sQ(10,2)*	744.4163	sP(11,2)	⊥	2.8e-21	-	-	-	-	1153.8316	sR(9,2)	⊥	1.2e-20
621.8448	sQ(10,3)*	744.0483	sP(11,3)	⊥	1.3e-20	958.3339	sQ(10,3)		4.9e-21	1153.7675	sR(9,3)	⊥	5.5e-20
622.6471	sQ(11,5)*	723.5852	sP(12,5)	⊥	6.4e-21	957.0148	sQ(11,5)		6.6e-21	1171.7796	sR(10,5)	⊥	3.0e-20
623.5677	sQ(14,9)*	662.0831	sP(15,9)	⊥	1.3e-21	952.4689	sQ(14,9)		4.5e-21	1224.7474	sR(13,9)	⊥	9.5e-21
637.6352	sQ(13,8)*	682.3510	sP(14,8)	⊥	1.8e-21	953.9629	sQ(13,8)		4.9e-21	1207.2632	sR(12,8)	⊥	1.1e-20
650.8201	sQ(9,1)*	764.0287	sP(10,1)	⊥	2.1e-21	-	-	-	-	1135.4778	sR(8,1)	⊥	7.6e-21
654.1073	sQ(10,4)*	743.5499	sP(11,4)	⊥	1.2e-20	958.0336	sQ(10,4)		8.6e-21	1153.6788	sR(9,4)	⊥	5.1e-20
654.6790	sQ(12,7)*	702.5800	sP(13,7)	⊥	4.5e-21	955.3295	sQ(12,7)		9.5e-21	1189.5741	sR(11,7)	⊥	2.4e-20
665.3558	sQ(9,2)*	763.8306	sP(10,2)	⊥	8.5e-21	959.1319	sQ(9,2)		1.5e-21	1135.4431	sR(8,2)	⊥	3.1e-20
674.9452	sQ(11,6)*	722.7704	sP(12,6)	⊥	2.0e-20	956.5704	sQ(11,6)		3.3e-20	1171.6833	sR(10,6)	⊥	9.4e-20
689.5634	sQ(9,3)*	763.4871	sP(10,3)	⊥	4.0e-20	958.9207	sQ(9,3)		1.7e-20	1135.3684	sR(8,3)	⊥	1.4e-19
698.7197	sQ(10,5)*	742.9225	sP(11,5)	⊥	2.0e-20	957.6872	sQ(10,5)		2.5e-20	1153.5940	sR(9,5)	⊥	8.3e-20
712.5116	sQ(16,12)*	-	-	-	-	948.0738	sQ(16,12)		1.5e-21	1259.1141	sR(15,12)	⊥	2.1e-21
715.1759	sQ(8,1)*	783.6022	sP(9,1)	⊥	5.9e-21	-	-	-	-	1116.9215	sR(7,1)	⊥	1.8e-20
715.7032	sQ(14,10)*	660.4908	sP(15,10)	⊥	1.0e-21	951.6684	sQ(14,10)		4.7e-21	1224.7097	sR(13,10)	⊥	6.8e-21
721.4841	sQ(13,9)*	680.9893	sP(14,9)	⊥	5.3e-21	953.2677	sQ(13,9)		2.1e-20	1207.2057	sR(12,9)	⊥	3.2e-20
726.3306	sQ(9,4)*	763.0366	sP(10,4)	⊥	3.6e-20	958.6817	sQ(9,4)		3.0e-20	1135.3090	sR(8,4)	⊥	1.3e-19
730.2018	sQ(12,8)*	701.4363	sP(13,8)	⊥	6.6e-21	954.7365	sQ(12,8)		2.1e-20	1189.5039	sR(11,8)	⊥	3.4e-20
731.0736	sQ(8,2)*	783.4198	sP(9,2)	⊥	2.4e-20	959.7310	sQ(8,2)		5.0e-21	1116.8881	sR(7,2)	⊥	7.4e-20
742.0019	sQ(11,7)*	721.8312	sP(12,7)	⊥	1.5e-20	956.0758	sQ(11,7)		3.8e-20	1171.6070	sR(10,7)	⊥	6.8e-20
757.0629	sQ(10,6)*	742.1737	sP(11,6)	⊥	6.3e-20	957.2866	sQ(10,6)		1.2e-19	1153.5174	sR(9,6)	⊥	2.5e-19
758.3559	sQ(8,3)*	783.1148	sP(9,3)	⊥	1.1e-19	959.5625	sQ(8,3)		5.6e-20	1116.8358	sR(7,3)	⊥	3.3e-19
775.5175	aR(2,2)	849.0059	aP(4,2)		1.0e-18	928.1815	aQ(3,2)	⊥	1.0e-18	987.6329	aR(2,2)		9.4e-19
775.5979	sQ(9,5)*	762.4634	sP(10,5)	⊥	6.0e-20	958.3701	sQ(9,5)		8.6e-20	1135.2379	sR(8,5)	⊥	2.0e-19
777.5447	sQ(7,1)*	803.3234	sP(8,1)	⊥	1.5e-20	-	-	-	-	1098.2006	sR(6,1)	⊥	4.1e-20
794.7519	sQ(7,2)*	803.1579	sP(8,2)	⊥	6.2e-20	960.3151	sQ(7,2)		1.6e-20	1098.1691	sR(6,2)	⊥	1.6e-19
796.1837	aR(2,1)	849.8334	aP(4,1)		1.9e-18	928.9725	aQ(3,1)	⊥	4.0e-19	988.3964	aR(2,1)		2.3e-18
797.8583	sQ(8,4)*	782.7001	sP(9,4)	⊥	9.9e-20	959.3273	sQ(8,4)		1.0e-19	1116.7710	sR(7,4)	⊥	2.9e-19
802.9860	aR(2,0)	850.1069	aP(4,0)		4.5e-18	-	-	-	-	988.6486	aR(2,0)		5.7e-18
823.9835	sQ(7,3)*	802.8811	sP(8,3)	⊥	2.8e-19	960.1544	sQ(7,3)		1.7e-19	1098.1154	sR(6,3)	⊥	7.0e-19
825.4977	sQ(12,9)*	700.1859	sP(13,9)	⊥	1.9e-20	954.1239	sQ(12,9)		9.0e-20	1189.4969	sR(11,9)	⊥	9.1e-20
827.0081	sQ(11,8)*	720.7853	sP(12,8)	⊥	2.1e-20	955.5527	sQ(11,8)		8.5e-20	1171.5758	sR(10,8)	⊥	9.1e-20
827.2044	sQ(13,10)*	679.5216	sP(14,10)	⊥	3.8e-21	952.5630	sQ(13,10)		2.2e-20	1207.2315	sR(12,10)	⊥	2.1e-20
831.8057	sQ(10,7)*	741.3189	sP(11,7)	⊥	4.5e-20	956.8500	sQ(10,7)		1.4e-19	1153.4702	sR(9,7)	⊥	1.7e-19
832.0875	sQ(14,11)*	658.7938	sP(15,11)	⊥	1.4e-21	950.8697	sQ(14,11)		9.9e-21	1224.7778	sR(13,11)	⊥	9.3e-21
836.4102	sQ(6,1)*	823.1646	sP(7,1)	⊥	3.7e-20	960.9555	sQ(6,1)		2.8e-21	1079.3180	sR(5,1)	⊥	8.4e-20
839.9900	sQ(9,6)*	761.7853	sP(10,6)	⊥	1.8e-19	958.0161	sQ(9,6)		4.3e-19	1135.1821	sR(8,6)	⊥	5.7e-19
851.3500	sQ(16,13)*	-	-	-	-	947.0851	sQ(16,13)		1.6e-21	1259.2981	sR(15,13)	⊥	1.4e-21
851.6939	sQ(8,5)*	782.1839	sP(9,5)	⊥	1.6e-19	959.0517	sQ(8,5)		2.8e-19	1116.7134	sR(7,5)	⊥	4.3e-19
854.8450	sQ(6,2)*	823.0167	sP(7,2)	⊥	1.5e-19	960.8707	sQ(6,2)		4.8e-20	1079.2881	sR(5,2)	⊥	3.2e-19

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Table S4 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
867.0846	sQ(7,4)*	802.5137	sP(8,4)	⊥	2.4e-19	959.9574	sQ(7,4)		3.1e-19	1098.0664	sR(6,4)	⊥	5.9e-19
886.4111	sQ(6,3)*	822.7744	sP(7,3)	⊥	6.5e-19	960.7353	sQ(6,3)		5.3e-19	1079.2443	sR(5,3)	⊥	1.3e-18
890.2670	sQ(5,1)*	843.0961	sP(6,1)	⊥	8.5e-20	961.4586	sQ(5,1)		8.3e-21	1060.2765	sR(4,1)	⊥	1.6e-19
909.8183	sQ(5,2)*	842.9657	sP(6,2)	⊥	3.3e-19	961.3831	sQ(5,2)		1.4e-19	1060.2474	sR(4,2)	⊥	5.9e-19
922.0162	sQ(8,6)*	781.5802	sP(9,6)	⊥	4.4e-19	958.7461	sQ(8,6)		1.4e-18	1116.6781	sR(7,6)	⊥	1.1e-18
922.4116	sQ(9,7)*	761.0208	sP(10,7)	⊥	1.2e-19	957.6410	sQ(9,7)		5.0e-19	1135.1653	sR(8,7)	⊥	3.4e-19
925.3043	sQ(7,5)*	802.0563	sP(8,5)	⊥	3.6e-19	959.7180	sQ(7,5)		8.9e-19	1098.0212	sR(6,5)	⊥	7.8e-19
926.4495	sQ(10,8)*	740.3798	sP(11,8)	⊥	6.1e-20	956.4029	sQ(10,8)		3.2e-19	1153.4815	sR(9,8)	⊥	2.0e-19
932.3515	sQ(6,4)*	822.4479	sP(7,4)	⊥	5.4e-19	960.5570	sQ(6,4)		9.4e-19	1079.1963	sR(5,4)	⊥	1.0e-18
934.1200	sQ(11,9)*	719.6587	sP(12,9)	⊥	5.7e-20	955.0317	sQ(11,9)		3.6e-19	1171.6251	sR(10,9)	⊥	2.2e-19
937.6801	sQ(4,1)*	863.0868	sP(5,1)	⊥	1.8e-19	961.9047	sQ(4,1)		2.5e-20	1041.0795	sR(3,1)	⊥	2.8e-19
943.2247	sQ(5,3)*	842.7529	sP(6,3)	⊥	1.4e-18	961.2619	sQ(5,3)		1.6e-18	1060.2039	sR(4,3)	⊥	2.2e-18
945.4435	sQ(12,10)*	698.8593	sP(13,10)	⊥	1.3e-20	953.5278	sQ(12,10)		9.6e-20	1189.5952	sR(11,10)	⊥	5.5e-20
958.2089	sQ(4,2)*	862.9735	sP(5,2)	⊥	6.7e-19	961.8378	sQ(4,2)		4.2e-19	1041.0501	sR(3,2)	⊥	9.4e-19
960.4703	sQ(13,11)*	677.9835	sP(14,11)	⊥	5.2e-21	951.8915	sQ(13,11)		4.7e-20	1207.3906	sR(12,11)	⊥	2.6e-20
977.3450	sQ(3,1)*	883.1056	sP(4,1)	⊥	3.8e-19	962.2805	sQ(3,1)		7.9e-20	1021.7324	sR(2,1)	⊥	4.5e-19
992.0120	sQ(5,4)*	842.4710	sP(6,4)	⊥	1.0e-18	961.1104	sQ(5,4)		2.8e-18	1060.1621	sR(4,4)	⊥	1.2e-18
993.3404	sQ(4,3)*	862.7911	sP(5,3)	⊥	2.5e-18	961.7332	sQ(4,3)		4.6e-18	1041.0083	sR(3,3)	⊥	2.7e-18
994.6724	sQ(6,5)*	822.0498	sP(7,5)	⊥	7.1e-19	960.3530	sQ(6,5)		2.7e-18	1079.1614	sR(5,5)	⊥	1.0e-18
998.6884	sQ(3,2)*	883.0085	sP(4,2)	⊥	1.3e-18	962.2208	sQ(3,2)		1.3e-18	1021.7011	sR(2,2)	⊥	1.2e-18
1001.3107	sQ(7,6)*	801.5289	sP(8,6)	⊥	9.1e-19	959.4609	sQ(7,6)		4.5e-18	1098.0049	sR(6,6)	⊥	1.5e-18
1008.1427	sQ(2,1)*	903.1219	sP(3,1)	⊥	7.7e-19	962.5738	sQ(2,1)		3.0e-19	1002.2424	sR(1,1)	⊥	6.3e-19
1011.9545	sQ(8,7)*	780.9101	sP(9,7)	⊥	2.7e-19	958.4344	sQ(8,7)		1.7e-18	1116.6915	sR(7,7)	⊥	5.0e-19
1026.6663	sQ(9,8)*	760.1956	sP(10,8)	⊥	1.4e-19	957.2742	sQ(9,8)		1.1e-18	1135.2204	sR(8,8)	⊥	3.1e-19
1029.1878	sQ(1,1)	923.1066	sP(2,1)	⊥	1.7e-18	962.7752	sQ(1,1)		2.0e-18	-	-	-	-
1030.1163	sQ(2,2)	903.0397	sP(3,2)	⊥	2.0e-18	962.5199	sQ(2,2)		5.0e-18	-	-	-	-
1035.2013	sQ(3,3)	882.8534	sP(4,3)	⊥	3.6e-18	962.1285	sQ(3,3)		1.5e-17	-	-	-	-
1044.4973	sQ(4,4)	862.5502	sP(5,4)	⊥	1.4e-18	961.6018	sQ(4,4)		8.3e-18	-	-	-	-
1058.0557	sQ(5,5)	842.1313	sP(6,5)	⊥	1.0e-18	960.9397	sQ(5,5)		8.0e-18	-	-	-	-
1962.7496	aR(4,4)	808.7145	aP(6,4)		3.4e-19	927.3000	aQ(5,4)	⊥	9.4e-19	1026.3034	aR(4,4)		4.2e-19
2008.8550	aR(4,3)	810.6636	aP(6,3)		1.5e-18	929.1231	aQ(5,3)	⊥	1.7e-18	1028.0196	aR(4,3)		2.4e-18
2040.4267	aR(4,2)	812.0189	aP(6,2)		1.0e-18	930.3882	aQ(5,2)	⊥	4.4e-19	1029.2092	aR(4,2)		1.8e-18
2058.8442	aR(4,1)	812.8174	aP(6,1)		1.2e-18	931.1330	aQ(5,1)	⊥	1.2e-19	1029.9089	aR(4,1)		2.3e-18
2064.9399	aR(4,0)	813.0825	aP(6,0)		2.6e-18	-	-	-	-	1030.1412	aR(4,0)		4.9e-18
2204.8641	sR(1,0)	903.1500	sP(3,0)		4.1e-18	-	-	-	-	1002.2548	sR(1,0)		3.9e-18
2212.3850	sR(1,1)*	903.1219	sP(3,1)		1.4e-18	962.5738	sQ(2,1)	⊥	5.4e-19	1002.2424	sR(1,1)		1.1e-18
2549.5250	aR(5,5)	788.2108	aP(7,5)		1.9e-19	926.4515	aQ(6,5)		7.1e-19	1045.2014	aR(5,5)		2.6e-19
2607.7753	aR(5,4)	790.7390	aP(7,4)		4.0e-19	928.7905	aQ(6,4)	⊥	7.0e-19	1047.3760	aR(5,4)		7.4e-19
2650.6138	aR(5,3)	792.6366	aP(7,3)		1.1e-18	930.5412	aQ(6,3)	⊥	9.3e-19	1049.0006	aR(5,3)		2.4e-18
2679.8574	aR(5,2)	793.9551	aP(7,2)		7.0e-19	931.7576	aQ(6,2)	⊥	2.2e-19	1050.1269	aR(5,2)		1.5e-18
2696.9273	aR(5,1)	794.7325	aP(7,1)		7.7e-19	932.4733	aQ(6,1)	⊥	5.8e-20	1050.7889	aR(5,1)		1.7e-18
2781.6717	sR(2,1)*	883.1056	sP(4,1)		1.7e-18	962.2805	sQ(3,1)	⊥	3.6e-19	1021.7324	sR(2,1)		2.0e-18
2804.3225	sR(2,2)*	883.0085	sP(4,2)		9.0e-19	962.2208	sQ(3,2)	⊥	9.4e-19	1021.7011	sR(2,2)		8.5e-19
3131.6836	aR(6,6)	767.4715	aP(8,6)		1.9e-19	925.3320	aQ(7,6)	⊥	9.6e-19	1063.8068	aR(6,6)		3.2e-19
3201.8854	aR(6,5)	770.5959	aP(8,5)		2.0e-19	928.1929	aQ(7,5)	⊥	5.0e-19	1066.4336	aR(6,5)		4.4e-19
3255.3447	aR(6,4)	773.0413	aP(8,4)		2.9e-19	930.4255	aQ(7,4)	⊥	3.8e-19	1068.4770	aR(6,4)		7.0e-19
3294.5656	aR(6,3)	774.8760	aP(8,3)		7.2e-19	932.0990	aQ(7,3)	⊥	4.5e-19	1070.0035	aR(6,3)		1.8e-18
3321.3515	aR(6,2)	776.1542	aP(8,2)		4.0e-19	933.2581	aQ(7,2)	⊥	1.0e-19	1071.0605	aR(6,2)		1.0e-18
3332.3527	sR(3,0)	863.1252	sP(5,0)		3.3e-18	-	-	-	-	1041.0901	sR(3,0)		5.2e-18

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Table S4 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
3336.9599	aR(6,1)	776.9067	aP(8,1)		4.3e-19	933.9411	aQ(7,1)	⊥	2.6e-20	1071.6819	aR(6,1)		1.1e-18
3339.6823	sR(3,1)*	863.0868	sP(5,1)		1.5e-18	961.9047	sQ(4,1)	⊥	2.1e-19	1041.0795	sR(3,1)		2.3e-18
3342.2269	aR(6,0)	777.1601	aP(8,0)		8.7e-19	-	-	-	-	1071.8917	aR(6,0)		2.3e-18
3361.9305	sR(3,2)*	862.9735	sP(5,2)		1.1e-18	961.8378	sQ(4,2)	⊥	6.9e-19	1041.0501	sR(3,2)		1.6e-18
3399.9562	sR(3,3)*	862.7911	sP(5,3)		1.1e-18	961.7332	sQ(4,3)	⊥	2.0e-18	1041.0083	sR(3,3)		1.2e-18
3709.1387	aR(7,7)	746.4976	aP(9,7)		4.8e-20	923.9409	aQ(8,7)	⊥	3.0e-19	1082.1173	aR(7,7)		9.0e-20
3791.2375	aR(7,6)	750.2397	aP(9,6)		2.0e-19	927.3337	aQ(8,6)	⊥	6.5e-19	1085.1942	aR(7,6)		4.9e-19
3854.9101	aR(7,5)	753.2438	aP(9,5)		1.4e-19	930.0467	aQ(8,5)	⊥	2.6e-19	1087.6437	aR(7,5)		3.9e-19
3886.7909	sR(4,1)*	843.0961	sP(6,1)		1.1e-18	961.4586	sQ(5,1)	⊥	1.1e-19	1060.2765	sR(4,1)		2.1e-18
3903.2969	aR(7,4)	755.5967	aP(9,4)		1.7e-19	932.1641	aQ(8,4)	⊥	1.7e-19	1089.5483	aR(7,4)		5.0e-19
3908.4539	sR(4,2)*	842.9657	sP(6,2)		9.3e-19	961.3831	sQ(5,2)	⊥	4.0e-19	1060.2474	sR(4,2)		1.7e-18
3938.8343	aR(7,3)	757.3661	aP(9,3)		3.8e-19	933.7465	aQ(8,3)	⊥	1.9e-19	1090.9695	aR(7,3)		1.2e-18
3945.4198	sR(4,3)*	842.7529	sP(6,3)		1.3e-18	961.2619	sQ(5,3)	⊥	1.5e-18	1060.2039	sR(4,3)		2.1e-18
3962.8672	aR(7,2)	758.5938	aP(9,2)		2.0e-19	934.8513	aQ(8,2)	⊥	4.3e-20	1091.9552	aR(7,2)		6.3e-19
3976.9280	aR(7,1)	759.3181	aP(9,1)		2.1e-19	935.4988	aQ(8,1)	⊥	1.1e-20	1092.5333	aR(7,1)		6.6e-19
3999.2593	sR(4,4)*	842.4710	sP(6,4)		3.1e-19	961.1104	sQ(5,4)	⊥	8.4e-19	1060.1621	sR(4,4)		3.8e-19
4281.7687	aR(8,8)	725.2889	aP(10,8)		2.2e-20	922.2766	aQ(9,8)	⊥	1.7e-19	1100.1298	aR(8,8)		4.8e-20
4375.8472	aR(8,7)	729.6743	aP(10,7)		4.5e-20	926.2153	aQ(9,7)	⊥	1.9e-19	1103.6586	aR(8,7)		1.3e-19
4416.6765	sR(5,0)	823.2145	sP(7,0)		1.4e-18	-	-	-	-	1079.3287	sR(5,0)		3.3e-18
4423.6044	sR(5,1)*	823.1646	sP(7,1)		7.0e-19	960.9555	sQ(6,1)	⊥	5.3e-20	1079.3180	sR(5,1)		1.6e-18
4444.5206	sR(5,2)*	823.0167	sP(7,2)		6.3e-19	960.8707	sQ(6,2)	⊥	2.0e-19	1079.2881	sR(5,2)		1.4e-18
4449.4279	aR(8,6)	733.2513	aP(10,6)		1.3e-19	929.4117	aQ(9,6)	⊥	3.1e-19	1106.5058	aR(8,6)		4.0e-19
4480.2496	sR(5,3)*	822.7744	sP(7,3)		1.0e-18	960.7353	sQ(6,3)	⊥	8.4e-19	1079.2443	sR(5,3)		2.2e-18
4506.3312	aR(8,5)	736.1253	aP(10,5)		7.6e-20	931.9683	aQ(9,5)	⊥	1.1e-19	1108.7712	aR(8,5)		2.6e-19
4532.1389	sR(5,4)*	822.4479	sP(7,4)		3.6e-19	960.5570	sQ(6,4)	⊥	6.3e-19	1079.1963	sR(5,4)		6.7e-19
4549.4675	aR(8,4)	738.3778	aP(10,4)		8.4e-20	933.9642	aQ(9,4)	⊥	6.9e-20	1110.5317	aR(8,4)		2.9e-19
4580.9637	aR(8,3)	740.0670	aP(10,3)		1.8e-19	935.4667	aQ(9,3)	⊥	7.6e-20	1111.8470	aR(8,3)		6.3e-19
4602.2531	sR(5,5)*	822.0498	sP(7,5)		1.7e-19	960.3530	sQ(6,5)	⊥	6.3e-19	1079.1614	sR(5,5)		2.4e-19
4602.3611	aR(8,2)	741.2493	aP(10,2)		9.2e-20	936.4980	aQ(9,2)	⊥	1.7e-20	1112.7555	aR(8,2)		3.3e-19
4614.8150	aR(8,1)	741.9425	aP(10,1)		9.3e-20	937.1074	aQ(9,1)	⊥	4.0e-21	1113.2882	aR(8,1)		3.4e-19
4619.2529	aR(8,0)	742.1836	aP(10,0)		1.9e-19	-	-	-	-	1113.4759	aR(8,0)		6.9e-19
4849.4170	aR(9,9)	703.8446	aP(11,9)		2.0e-20	920.3364	aQ(10,9)	⊥	1.9e-19	1117.8403	aR(9,9)		5.0e-20
4950.9148	sR(6,1)*	803.3234	sP(8,1)		3.9e-19	960.4097	sQ(7,1)	⊥	2.4e-20	1098.2006	sR(6,1)		1.0e-18
4955.6958	aR(9,8)	708.9029	aP(11,8)		2.0e-20	924.8390	aQ(10,8)	⊥	1.0e-19	1121.8267	aR(9,8)		6.5e-20
4970.9484	sR(6,2)*	803.1579	sP(8,2)		3.7e-19	960.3151	sQ(7,2)	⊥	9.4e-20	1098.1691	sR(6,2)		9.6e-19
5004.9604	sR(6,3)*	802.8811	sP(8,3)		6.5e-19	960.1544	sQ(7,3)	⊥	4.1e-19	1098.1154	sR(6,3)		1.7e-18
5039.0055	aR(9,7)	713.0715	aP(11,7)		2.7e-20	928.5258	aQ(10,7)	⊥	8.5e-20	1125.0668	aR(9,7)		9.9e-20
5054.7805	sR(6,4)*	802.5137	sP(8,4)		2.7e-19	959.9574	sQ(7,4)	⊥	3.4e-19	1098.0664	sR(6,4)		6.4e-19
5103.9180	aR(9,6)	716.4733	aP(11,6)		6.3e-20	931.5188	aQ(10,6)	⊥	1.2e-19	1127.6792	aR(9,6)		2.5e-19
5121.8624	sR(6,5)*	802.0563	sP(8,5)		1.8e-19	959.7180	sQ(7,5)	⊥	4.5e-19	1098.0212	sR(6,5)		3.9e-19
5153.9450	aR(9,5)	719.2098	aP(11,5)		3.4e-20	933.9135	aQ(10,5)	⊥	4.1e-20	1129.7566	aR(9,5)		1.4e-19
5191.7560	aR(9,4)	721.3565	aP(11,4)		3.6e-20	935.7839	aQ(10,4)	⊥	2.5e-20	1131.3704	aR(9,4)		1.5e-19
5208.9842	sR(6,6)*	801.5289	sP(8,6)		1.7e-19	959.4609	sQ(7,6)	⊥	8.6e-19	1098.0049	sR(6,6)		2.8e-19
5219.5156	aR(9,3)	722.9772	aP(11,3)		7.3e-20	937.1727	aQ(10,3)	⊥	2.7e-20	1132.5723	aR(9,3)		3.1e-19
5237.8509	aR(9,2)	724.0956	aP(11,2)		3.7e-20	938.1591	aQ(10,2)	⊥	5.8e-21	1133.4078	aR(9,2)		1.6e-19
5248.6614	aR(9,1)	724.7547	aP(11,1)		3.7e-20	938.7280	aQ(10,1)	⊥	1.4e-21	1133.8930	aR(9,1)		1.6e-19
5411.8921	aR(10,10)	682.1626	aP(12,10)		4.2e-21	918.1169	aQ(11,10)	⊥	4.7e-20	1135.2437	aR(10,10)		1.2e-20
5463.2430	sR(7,0)	783.6637	sP(9,0)		3.9e-19	-	-	-	-	1116.9334	sR(7,0)		1.2e-18
5469.6489	sR(7,1)*	783.6022	sP(9,1)		1.9e-19	959.8352	sQ(8,1)	⊥	9.9e-21	1116.9215	sR(7,1)		6.1e-19

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Table S4 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	P				Q				R			
		Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	QN	Pola.	G_m [uG _m]
5488.6927	sR(7,2)*	783.4198	sP(9,2)		1.9e-19	959.7310	sQ(8,2)	⊥	4.0e-20	1116.8881	sR(7,2)		5.8e-19
5521.1737	sR(7,3)*	783.1148	sP(9,3)		3.5e-19	959.5625	sQ(8,3)	⊥	1.8e-19	1116.8358	sR(7,3)		1.1e-18
5530.7308	aR(10,9)	687.9275	aP(12,9)		1.6e-20	923.2054	aQ(11,9)	⊥	1.0e-19	1139.6972	aR(10,9)		6.2e-20
5568.2399	sR(7,4)*	782.7001	sP(9,4)		1.6e-19	959.3273	sQ(8,4)	⊥	1.6e-19	1116.7710	sR(7,4)		4.6e-19
5623.7144	aR(10,8)	692.7070	aP(12,8)		1.1e-20	927.3929	aQ(11,8)	⊥	4.3e-20	1143.3290	aR(10,8)		4.6e-20
5631.9086	sR(7,5)*	782.1839	sP(9,5)		1.3e-19	959.0517	sQ(8,5)	⊥	2.3e-19	1116.7134	sR(7,5)		3.5e-19
5696.2492	aR(10,7)	696.6496	aP(12,7)		1.2e-20	930.8230	aQ(11,7)	⊥	3.1e-20	1146.2783	aR(10,7)		5.6e-20
5714.5641	sR(7,6)*	781.5802	sP(9,6)		1.8e-19	958.7461	sQ(8,6)	⊥	5.8e-19	1116.6781	sR(7,6)		4.4e-19
5752.5067	aR(10,6)	699.8725	aP(12,6)		2.6e-20	933.6091	aQ(11,6)	⊥	4.3e-20	1148.6546	aR(10,6)		1.2e-19
5795.6804	aR(10,5)	702.4674	aP(12,5)		1.4e-20	935.8397	aQ(11,5)	⊥	1.4e-20	1150.5434	aR(10,5)		6.4e-20
5819.5382	sR(7,7)*	780.9101	sP(9,7)		4.3e-20	958.4344	sQ(8,7)	⊥	2.7e-19	1116.6915	sR(7,7)		8.0e-20
5828.1920	aR(10,4)	704.5051	aP(12,4)		1.4e-20	937.5827	aQ(11,4)	⊥	8.3e-21	1152.0101	aR(10,4)		6.6e-20
5851.7164	aR(10,3)	706.0298	aP(12,3)		2.7e-20	938.9119	aQ(11,3)	⊥	8.8e-21	1153.1075	aR(10,3)		1.3e-19
5867.4735	aR(10,2)	707.1077	aP(12,2)		1.3e-20	939.7973	aQ(11,2)	⊥	1.9e-21	1153.8608	aR(10,2)		6.6e-20
5876.6166	aR(10,1)	707.7293	aP(12,1)		1.3e-20	-	-	-	-	1154.2960	aR(10,1)		6.6e-20
5880.4210	aR(10,0)	707.9631	aP(12,0)		2.7e-20	-	-	-	-	1154.4678	aR(10,0)		1.3e-19
5968.9680	aR(11,11)	660.2402	aP(13,11)		1.7e-21	915.6137	aQ(12,11)	⊥	2.2e-20	1152.3342	aR(11,11)		5.6e-21
5980.8113	sR(8,1)*	764.0287	sP(10,1)		8.7e-20	959.2449	sQ(9,1)	⊥	3.8e-21	1135.4778	sR(8,1)		3.2e-19
5998.7901	sR(8,2)*	763.8306	sP(10,2)		8.5e-20	959.1319	sQ(9,2)	⊥	1.5e-20	1135.4431	sR(8,2)		3.1e-19
6028.8830	sR(8,3)*	763.4871	sP(10,3)		1.6e-19	958.9207	sQ(9,3)	⊥	7.0e-20	1135.3684	sR(8,3)		5.9e-19
6073.6564	sR(8,4)*	763.0366	sP(10,4)		7.7e-20	958.6817	sQ(9,4)	⊥	6.3e-20	1135.3090	sR(8,4)		2.7e-19
6100.8668	aR(11,10)	666.7491	aP(13,10)		3.2e-21	921.3138	aQ(12,10)	⊥	2.4e-20	1157.2682	aR(11,10)		1.4e-20
6133.6230	sR(8,5)*	762.4634	sP(10,5)		6.9e-20	958.3701	sQ(9,5)	⊥	1.0e-19	1135.2379	sR(8,5)		2.3e-19
6203.5918	aR(11,9)	672.1653	aP(13,9)		8.2e-21	926.0159	aQ(12,9)	⊥	4.0e-20	1161.2938	aR(11,9)		4.0e-20
6211.4341	sR(8,6)*	761.7853	sP(10,6)		1.1e-19	958.0161	sQ(9,6)	⊥	2.8e-19	1135.1821	sR(8,6)		3.7e-19
6283.4778	aR(11,8)	676.6621	aP(13,8)		4.6e-21	929.8873	aQ(12,8)	⊥	1.5e-20	1164.5731	aR(11,8)		2.4e-20
6310.2136	sR(8,7)*	761.0208	sP(10,7)		4.1e-20	957.6410	sQ(9,7)	⊥	1.7e-19	1135.1653	sR(8,7)		1.2e-19
6345.4240	aR(11,7)	680.3768	aP(13,7)		4.8e-21	933.0607	aQ(12,7)	⊥	1.0e-20	1167.2341	aR(11,7)		2.5e-20
6393.1947	aR(11,6)	683.4179	aP(13,6)		9.6e-21	935.6403	aQ(12,6)	⊥	1.3e-20	1169.3769	aR(11,6)		5.2e-20
6429.6608	aR(11,5)	685.8698	aP(13,5)		4.7e-21	937.7070	aQ(12,5)	⊥	4.3e-21	1171.0793	aR(11,5)		2.6e-20
6434.0366	sR(8,8)*	760.1956	sP(10,8)		2.0e-20	957.2742	sQ(9,8)	⊥	1.5e-19	1135.2204	sR(8,8)		4.3e-20
6456.9926	aR(11,4)	687.7976	aP(13,4)		4.6e-21	939.3234	aQ(12,4)	⊥	2.5e-21	1172.4010	aR(11,4)		2.6e-20
6477.0889	aR(11,3)	689.2638	aP(13,3)		9.0e-21	940.4994	aQ(12,3)	⊥	2.6e-21	1173.3815	aR(11,3)		5.1e-20
6479.5484	sR(9,0)	744.6999	sP(11,0)		6.9e-20	-	-	-	-	1153.8798	sR(9,0)		2.9e-19
6485.4297	sR(9,1)*	744.6278	sP(11,1)		3.5e-20	958.6504	sQ(10,1)	⊥	1.3e-21	1153.8665	sR(9,1)		1.5e-19
6489.5294	aR(11,2)	690.2625	aP(13,2)		4.4e-21	-	-	-	-	1174.0674	aR(11,2)		2.5e-20
6496.9603	aR(11,1)	690.8410	aP(13,1)		4.3e-21	-	-	-	-	1174.4480	aR(11,1)		2.5e-20
6502.3053	sR(9,2)*	744.4163	sP(11,2)		3.4e-20	958.5303	sQ(10,2)	⊥	5.4e-21	1153.8316	sR(9,2)		1.5e-19
6520.3828	aR(12,12)	638.0736	aP(14,12)		1.3e-21	912.8215	aQ(13,12)	⊥	2.0e-20	1169.1052	aR(12,12)		4.9e-21
6530.9238	sR(9,3)*	744.0483	sP(11,3)		6.8e-20	958.3339	sQ(10,3)	⊥	2.5e-20	1153.7675	sR(9,3)		2.9e-19
6572.1939	sR(9,4)*	743.5499	sP(11,4)		3.3e-20	958.0336	sQ(10,4)	⊥	2.3e-20	1153.6788	sR(9,4)		1.4e-19
6628.2622	sR(9,5)*	742.9225	sP(11,5)		3.2e-20	957.6872	sQ(10,5)	⊥	3.8e-20	1153.5940	sR(9,5)		1.3e-19
6665.9869	aR(12,11)	645.3681	aP(14,11)		1.2e-21	919.1630	aQ(13,11)	⊥	1.1e-20	1174.5366	aR(12,11)		5.9e-21
6700.9706	sR(9,6)*	742.1737	sP(11,6)		5.8e-20	957.2866	sQ(10,6)	⊥	1.1e-19	1153.5174	sR(9,6)		2.3e-19
6778.6414	aR(12,10)	651.4491	aP(14,10)		1.5e-21	924.3968	aQ(13,10)	⊥	8.5e-21	1178.9616	aR(12,10)		8.2e-21
6793.2227	sR(9,7)*	741.3189	sP(11,7)		2.4e-20	956.8500	sQ(10,7)	⊥	7.7e-20	1153.4702	sR(9,7)		9.0e-20
6865.7183	aR(12,9)	656.5173	aP(14,9)		3.2e-21	928.7167	aQ(13,9)	⊥	1.3e-20	1182.5672	aR(12,9)		1.9e-20
6908.8116	sR(9,8)*	740.3798	sP(11,8)		1.8e-20	956.4029	sQ(10,8)	⊥	9.2e-20	1153.4815	sR(9,8)		5.9e-20
6932.9227	aR(12,8)	660.7324	aP(14,8)		1.6e-21	932.2764	aQ(13,8)	⊥	4.4e-21	1185.5016	aR(12,8)		1.0e-20

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Table S4 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	Freq. [cm ⁻¹]	P QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	Q QN	Pola.	G_m [u G_m]	Freq. [cm ⁻¹]	R QN	Pola.	G_m [u G_m]
6984.5059	sR(10,1)*	725.4212	sP(12,1)		1.3e-20	-	-	-	-	1172.0833	sR(10,1)		6.2e-20
6984.6435	aR(12,7)	664.2208	aP(14,7)		1.6e-21	935.1972	aQ(13,7)	⊥	2.9e-21	1187.8811	aR(12,7)		1.0e-20
7000.2852	sR(10,2)*	725.1998	sP(12,2)		1.3e-20	957.9369	sQ(11,2)	⊥	1.7e-21	1172.0509	sR(10,2)		6.2e-20
7024.2368	aR(12,6)	667.0816	aP(14,6)		3.1e-21	937.5739	aQ(13,6)	⊥	3.8e-21	1189.7963	aR(12,6)		1.9e-20
7025.6923	sR(10,3)*	724.7878	sP(12,3)		2.5e-20	957.6577	sQ(11,3)	⊥	8.3e-21	1171.9433	sR(10,3)		1.2e-19
7052.6371	sR(9,9)*	739.3875	sP(11,9)		1.8e-20	955.9809	sQ(10,9)	⊥	1.7e-19	1153.5912	sR(9,9)		4.4e-20
7054.2505	aR(12,5)	669.3919	aP(14,5)		1.5e-21	939.4802	aQ(13,5)	⊥	1.2e-21	1191.3175	aR(12,5)		9.5e-21
7064.9804	sR(10,4)*	724.2631	sP(12,4)		1.3e-20	957.3935	sQ(11,4)	⊥	7.8e-21	1171.8773	sR(10,4)		6.1e-20
7065.8405	aR(13,13)	-	-	-	-	909.7343	aQ(14,13)	⊥	4.1e-21	1185.5492	aR(13,13)		1.0e-21
7076.6067	aR(12,4)	671.2109	aP(14,4)		1.4e-21	-	-	-	-	1192.4981	aR(12,4)		9.1e-21
7092.4858	aR(12,3)	672.5636	aP(14,3)		2.7e-21	-	-	-	-	1193.3855	aR(12,3)		1.8e-20
7102.4913	aR(12,2)	673.5394	aP(14,2)		1.3e-21	-	-	-	-	1193.9855	aR(12,2)		8.6e-21
7108.0129	aR(12,1)	674.0612	aP(14,1)		1.3e-21	-	-	-	-	1194.2988	aR(12,1)		8.1e-21
7112.0577	aR(12,0)	674.3144	aP(14,0)		2.6e-21	-	-	-	-	1194.4827	aR(12,0)		1.7e-20
7117.0472	sR(10,5)*	723.5852	sP(12,5)		1.3e-20	957.0148	sQ(11,5)	⊥	1.3e-20	1171.7796	sR(10,5)		6.0e-20
7184.5146	sR(10,6)*	722.7704	sP(12,6)		2.4e-20	956.5704	sQ(11,6)	⊥	4.0e-20	1171.6833	sR(10,6)		1.1e-19
7225.9432	aR(13,12)	-	-	-	-	916.7508	aQ(14,12)	⊥	8.6e-21	1191.4987	aR(13,12)		4.7e-21
7270.0567	sR(10,7)*	721.8312	sP(12,7)		1.1e-20	956.0758	sQ(11,7)	⊥	2.9e-20	1171.6070	sR(10,7)		5.1e-20
7348.8371	aR(13,11)	-	-	-	-	922.5368	aQ(14,11)	⊥	3.4e-21	1196.3317	aR(13,11)		3.2e-21
7377.1723	sR(10,8)*	720.7853	sP(12,8)		9.8e-21	955.5527	sQ(11,8)	⊥	3.9e-20	1171.5758	sR(10,8)		4.2e-20
7443.0517	aR(13,10)	-	-	-	-	927.3152	aQ(14,10)	⊥	2.5e-21	1200.2629	aR(13,10)		3.6e-21
7473.4309	sR(11,0)	706.5071	sP(13,0)		8.2e-21	-	-	-	-	1190.1364	sR(11,0)		4.7e-20
7478.9737	sR(11,1)*	706.4264	sP(13,1)		4.1e-21	-	-	-	-	1190.1224	sR(11,1)		2.3e-20
7493.7373	sR(11,2)*	706.2020	sP(13,2)		4.1e-21	-	-	-	-	1190.0983	sR(11,2)		2.3e-20
7510.3917	sR(10,9)*	719.6587	sP(12,9)		1.4e-20	955.0317	sQ(11,9)	⊥	9.2e-20	1171.6251	sR(10,9)		5.5e-20
7515.1871	aR(13,9)	640.9475	aP(15,9)		1.0e-21	931.2631	aQ(14,9)	⊥	3.5e-21	1203.4625	aR(13,9)		7.4e-21
7518.0699	sR(11,3)*	705.7663	sP(13,3)		8.5e-21	957.1465	sQ(12,3)	⊥	2.5e-21	1190.0164	sR(11,3)		4.8e-20
7553.0551	sR(11,4)*	705.1952	sP(13,4)		4.3e-21	956.7697	sQ(12,4)	⊥	2.4e-21	1189.9003	sR(11,4)		2.4e-20
7570.3202	aR(13,8)	-	-	-	-	934.5203	aQ(14,8)	⊥	1.2e-21	1206.0643	aR(13,8)		3.6e-21
7601.1059	sR(11,5)*	704.4714	sP(13,5)		4.4e-21	956.3615	sQ(12,5)	⊥	4.0e-21	1189.7912	sR(11,5)		2.5e-20
7605.0104	aR(14,14)	-	-	-	-	906.3451	aQ(15,14)	⊥	1.6e-21	-	-	-	-
7612.3331	aR(13,7)	-	-	-	-	-	-	-	-	1208.1730	aR(13,7)		3.4e-21
7644.1785	aR(13,6)	-	-	-	-	-	-	-	-	1209.8698	aR(13,6)		6.5e-21
7663.3095	sR(11,6)*	703.5964	sP(13,6)		8.9e-21	955.8772	sQ(12,6)	⊥	1.3e-20	1189.6771	sR(11,6)		4.9e-20
7668.0897	aR(13,5)	-	-	-	-	-	-	-	-	1211.2171	aR(13,5)		3.1e-21
7675.5329	sR(10,10)*	718.4882	sP(12,10)		3.7e-21	954.5556	sQ(11,10)	⊥	4.2e-20	1171.8033	sR(10,10)		1.1e-20
7685.7436	aR(13,4)	-	-	-	-	-	-	-	-	1212.2627	aR(13,4)		2.9e-21
7698.7740	aR(13,3)	-	-	-	-	-	-	-	-	1213.0313	aR(13,3)		5.5e-21
7704.9018	aR(13,2)	-	-	-	-	-	-	-	-	1213.5786	aR(13,2)		2.6e-21
7707.1865	aR(13,1)	-	-	-	-	-	-	-	-	1213.7653	aR(13,1)		2.2e-21
7742.1049	sR(11,7)*	702.5800	sP(13,7)		4.4e-21	955.3295	sQ(12,7)	⊥	9.4e-21	1189.5741	sR(11,7)		2.4e-20
7780.5556	aR(14,13)	-	-	-	-	914.0740	aQ(15,13)	⊥	1.6e-21	-	-	-	-
7840.6877	sR(11,8)*	701.4363	sP(13,8)		4.2e-21	954.7365	sQ(12,8)	⊥	1.3e-20	1189.5039	sR(11,8)		2.2e-20
7914.1222	aR(14,12)	-	-	-	-	920.4360	aQ(15,12)	⊥	2.6e-21	1213.4027	aR(14,12)		2.4e-21
7963.2093	sR(11,9)*	700.1859	sP(13,9)		7.4e-21	954.1239	sQ(12,9)	⊥	3.6e-20	1189.4969	sR(11,9)		3.6e-20
7969.6902	sR(12,1)*	687.6576	sP(14,1)		1.2e-21	-	-	-	-	1207.9767	sR(12,1)		8.0e-21
7983.7205	sR(12,2)*	687.4456	sP(14,2)		1.2e-21	-	-	-	-	1207.9754	sR(12,2)		7.9e-21
8003.3788	sR(12,3)*	686.9478	sP(14,3)		2.6e-21	-	-	-	-	1207.8042	sR(12,3)		1.7e-20
8015.5261	aR(14,11)	-	-	-	-	-	-	-	-	1217.6614	aR(14,11)		1.3e-21

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Table S4 – continued from previous page

THz laser		IR pump											
Freq. [GHz]	QN	Freq. [cm ⁻¹]	P QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	Q QN	Pola.	G_m [uG _m]	Freq. [cm ⁻¹]	R QN	Pola.	G_m [uG _m]
8037.3234	sR(12,4)*	686.3611	sP(14,4)		1.3e-21	-	-	-	-	1207.7414	sR(12,4)		8.6e-21
8081.4261	sR(12,5)*	685.5965	sP(14,5)		1.4e-21	955.7328	sQ(13,5)	⊥	1.1e-21	1207.6229	sR(12,5)		8.9e-21
8092.3629	aR(14,10)	-	-	-	-	-	-	-	-	1221.1206	aR(14,10)		1.3e-21
8115.0170	sR(11,10)*	698.8593	sP(13,10)		2.8e-21	953.5278	sQ(12,10)	⊥	2.2e-20	1189.5952	sR(11,10)		1.2e-20
8137.5257	aR(15,15)	-	-	-	-	902.6464	aQ(16,15)	⊥	1.2e-21	-	-	-	-
8138.4506	sR(12,6)*	684.6680	sP(14,6)		2.9e-21	955.2132	sQ(13,6)	⊥	3.6e-21	1207.4939	sR(12,6)		1.8e-20
8150.4695	aR(14,9)	-	-	-	-	-	-	-	-	1223.9334	aR(14,9)		2.4e-21
8194.3034	aR(14,8)	-	-	-	-	-	-	-	-	1226.2194	aR(14,8)		1.1e-21
8210.5983	sR(12,7)*	683.5826	sP(14,7)		1.5e-21	954.6184	sQ(13,7)	⊥	2.7e-21	1207.3679	sR(12,7)		9.4e-21
8227.2521	aR(14,7)	-	-	-	-	-	-	-	-	1228.0715	aR(14,7)		1.0e-21
8251.8767	aR(14,6)	-	-	-	-	-	-	-	-	1229.5614	aR(14,6)		1.9e-21
8292.4468	aR(14,3)	-	-	-	-	-	-	-	-	1232.3611	aR(14,3)		1.6e-21
8300.7597	sR(12,8)*	682.3510	sP(14,8)		1.5e-21	953.9629	sQ(13,8)	⊥	4.1e-21	1207.2632	sR(12,8)		9.3e-21
8302.9536	sR(11,11)*	697.5003	sP(13,11)		1.5e-21	952.9994	sQ(12,11)	⊥	2.0e-20	1189.8570	sR(11,11)		4.9e-21
8303.8143	aR(14,0)	-	-	-	-	-	-	-	-	1233.2108	aR(14,0)		1.5e-21
8412.7001	sR(12,9)*	680.9893	sP(14,9)		2.9e-21	953.2677	sQ(13,9)	⊥	1.2e-20	1207.2057	sR(12,9)		1.8e-20
8451.4789	sR(13,0)	-	-	-	-	-	-	-	-	1225.6508	sR(13,0)		5.0e-21
8457.5344	sR(13,1)*	-	-	-	-	-	-	-	-	1225.6372	sR(13,1)		2.5e-21
8472.2848	sR(13,2)*	-	-	-	-	-	-	-	-	1225.7206	sR(13,2)		2.1e-21
8489.8595	sR(13,3)*	-	-	-	-	-	-	-	-	1225.5374	sR(13,3)		5.3e-21
8518.5220	sR(13,4)*	-	-	-	-	-	-	-	-	1225.3927	sR(13,4)		2.8e-21
8551.2894	sR(12,10)*	679.5216	sP(14,10)		1.3e-21	952.5630	sQ(13,10)	⊥	7.8e-21	1207.2315	sR(12,10)		7.5e-21
8558.8184	sR(13,5)*	-	-	-	-	-	-	-	-	1225.2673	sR(13,5)		2.9e-21
8610.8440	sR(13,6)*	-	-	-	-	-	-	-	-	1225.1266	sR(13,6)		6.1e-21
8676.5663	sR(13,7)*	-	-	-	-	-	-	-	-	1224.9818	sR(13,7)		3.2e-21
8722.7820	sR(12,11)*	677.9835	sP(14,11)		1.0e-21	951.8915	sQ(13,11)	⊥	9.4e-21	1207.3906	sR(12,11)		5.2e-21
8758.5710	sR(13,8)*	-	-	-	-	953.2363	sQ(14,8)	⊥	1.1e-21	1224.8482	sR(13,8)		3.4e-21
8860.2390	sR(13,9)*	-	-	-	-	952.4689	sQ(14,9)	⊥	3.2e-21	1224.7474	sR(13,9)		6.9e-21
8935.1640	sR(12,12)*	676.4266	sP(14,12)		1.1e-21	951.3138	sQ(13,12)	⊥	1.7e-20	1207.7525	sR(12,12)		4.2e-21
8967.9670	sR(14,3)*	-	-	-	-	-	-	-	-	1242.8904	sR(14,3)		1.5e-21
8985.9593	sR(13,10)*	-	-	-	-	951.6684	sQ(14,10)	⊥	2.3e-21	1224.7097	sR(13,10)		3.3e-21
9081.1782	sR(14,6)*	-	-	-	-	-	-	-	-	1242.5658	sR(14,6)		1.8e-21
9141.3948	sR(13,11)*	-	-	-	-	950.8697	sQ(14,11)	⊥	3.1e-21	1224.7778	sR(13,11)		2.9e-21
9215.0497	sR(14,8)*	-	-	-	-	-	-	-	-	1242.2507	sR(14,8)		1.1e-21
9306.9223	sR(14,9)*	-	-	-	-	-	-	-	-	1242.1145	sR(14,9)		2.3e-21
9333.8109	sR(13,12)*	-	-	-	-	950.1234	sQ(14,12)	⊥	7.7e-21	1225.0106	sR(13,12)		4.2e-21
9420.3328	sR(14,10)*	-	-	-	-	-	-	-	-	1242.0236	sR(14,10)		1.2e-21
9560.3560	sR(14,11)*	-	-	-	-	-	-	-	-	1242.0134	sR(14,11)		1.2e-21
9572.4649	sR(13,13)*	-	-	-	-	949.5007	sQ(14,13)	⊥	3.6e-21	-	-	-	-
9733.5344	sR(14,12)*	-	-	-	-	949.0439	sQ(15,12)	⊥	2.3e-21	1242.1339	sR(14,12)		2.1e-21
9948.2560	sR(14,13)*	-	-	-	-	948.2242	sQ(15,13)	⊥	1.5e-21	-	-	-	-

Table S5: Laser lines of $^{14}\text{NH}_3$ in competition for a given MIR pumping of the ν_2 band. These lines are reported with asterisk in the rest of the article.

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
680.8321	1171.5755	⊥	1.1e-20	8994.5770		1.0e-21	
683.6716	863.8601	⊥	3.4e-21	8605.1766		1.2e-21	
685.0379	755.4456	⊥	4.8e-21	8464.1588		2.7e-21	
686.3134	669.2437	⊥	1.6e-21	8350.0699		1.4e-21	
687.4722	600.8666	⊥	1.1e-21	8258.0496		1.4e-21	
688.4970	546.9373	⊥	1.4e-21	8184.3282		2.7e-21	
701.9597	1138.1722	⊥	1.4e-20	8360.0103		1.4e-21	
703.1943	984.3138	⊥	1.1e-20	8169.4783		2.6e-21	
704.4141	861.6717	⊥	1.7e-20	8015.2658		6.8e-21	
705.5734	763.9947	⊥	5.9e-21	7890.5869		3.9e-21	
706.6404	686.4131	⊥	4.0e-21	7790.1177		4.1e-21	
707.5927	625.1605	⊥	5.2e-21	7709.7126		8.2e-21	
708.4153	577.3480	⊥	1.6e-21	7646.1710		4.1e-21	
723.0027	1109.5454	⊥	3.1e-20	7730.3501		3.4e-21	
724.0613	972.3013	⊥	5.2e-20	7562.8654		1.3e-20	
725.0925	862.8099	⊥	1.9e-20	7427.5070		9.0e-21	
726.0576	775.7261	⊥	1.4e-20	7318.4990		1.0e-20	
726.9295	706.8979	⊥	1.8e-20	7231.3277		2.2e-20	
727.6892	653.1278	⊥	5.7e-21	7162.4972		1.2e-20	
728.3232	611.9772	⊥	3.4e-21	7109.3284		1.2e-20	
728.8132	580.4775	⊥	3.6e-21	7069.1462		2.3e-20	
743.9582	1085.4985	⊥	1.3e-19	7105.3300		1.6e-20	
744.8509	964.0600	⊥	5.5e-20	6959.4111		1.6e-20	
745.7056	867.3425	⊥	4.1e-20	6841.9437		2.2e-20	
746.4900	790.8172	⊥	5.7e-20	6748.0585		5.3e-20	
747.1812	730.9841	⊥	1.8e-20	6673.9742		2.9e-20	
747.7627	685.1681	⊥	1.1e-20	6616.7879		3.1e-20	
748.2265	651.9892	⊥	1.2e-20	6574.6673		6.3e-20	
748.5698	628.5864	⊥	2.5e-21	6545.4309		3.2e-20	
764.8236	1065.8671	⊥	1.3e-19	6484.7191		1.8e-20	
765.5612	959.5663	⊥	1.1e-19	6359.0503		3.8e-20	
766.2525	875.3682	⊥	1.6e-19	6258.6483		1.1e-19	
766.8705	809.4812	⊥	5.4e-20	6179.4596		6.4e-20	
767.3960	759.0008	⊥	3.3e-20	6118.3675		7.1e-20	
767.8090	721.2642	⊥	3.5e-20	6072.6859		1.5e-19	
768.1283	696.4339	⊥	7.6e-21	6042.0165		7.8e-20	
768.3114	681.5026	⊥	1.9e-21	6023.6695		7.9e-20	
785.5963	1050.5203	⊥	2.4e-19	5868.3228		3.8e-20	
786.1906	958.8279	⊥	4.0e-19	5761.7491		1.6e-19	
786.7323	887.0183	⊥	1.4e-19	5677.7236		1.1e-19	
787.1989	831.9689	⊥	8.8e-20	5612.9291		1.4e-19	
787.5761	791.5310	⊥	9.6e-20	5564.9930		3.1e-19	
787.8547	763.5831	⊥	2.2e-20	5531.8880		1.7e-19	
788.0214	747.2868	⊥	5.0e-21	5512.4717		1.7e-19	
806.2742	1039.3598	⊥	8.0e-19	5255.9823		1.6e-19	
806.7377	961.8846	⊥	1.3e-19	5167.5058		6.9e-20	
807.1441	902.4589	⊥	2.2e-19	5099.3040		2.5e-19	
807.4718	858.3951	⊥	2.4e-19	5048.5821		5.6e-19	
807.7223	828.5256	⊥	5.3e-20	5013.9753		3.2e-19	
807.8716	810.9190	⊥	1.3e-20	4993.5672		3.4e-19	
826.8553	1032.3214	⊥	6.5e-19	4647.5756		1.5e-19	
827.2011	968.8093	⊥	4.7e-19	4576.3508		3.2e-19	
827.4878	921.9405	⊥	5.8e-19	4523.5918		9.5e-19	
827.7021	889.7112	⊥	1.3e-19	4487.2388		5.6e-19	
827.8334	870.8782	⊥	3.4e-20	4465.9475		6.4e-19	
847.3376	1029.3749	⊥	9.1e-19	4043.0164		2.8e-19	
847.5781	979.6498	⊥	1.2e-18	3988.2917		1.2e-18	

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Table S5 – continued from previous page

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
847.7629	945.6048	⊥	3.0e-19	3950.7233		8.5e-19	
847.8763	925.6582	⊥	7.7e-20	3928.6856		1.0e-18	
867.7196	1030.5299	⊥	2.3e-18	3442.2588		9.9e-19	
867.8729	994.7477	⊥	6.1e-19	3403.6125		1.0e-18	
867.9689	973.8268	⊥	1.7e-19	3380.9901		1.4e-18	
887.9998	1035.8161	⊥	1.1e-18	2845.2812		8.2e-19	
888.0794	1014.0847	⊥	3.4e-19	2822.2564		1.6e-18	
908.1768	1045.3191	⊥	6.9e-19	2252.1120		1.3e-18	
953.1392	1043.6537		7.8e-21	10009.3750	⊥	1.3e-21	
953.8223	878.0883		7.3e-21	9791.4158	⊥	2.1e-21	
954.5783	1209.9839		4.4e-20	9634.3511	⊥	3.6e-21	
955.0557	1019.8937		3.7e-20	9392.5929	⊥	7.0e-21	
955.6767	869.3362		8.8e-21	9197.2232	⊥	2.8e-21	
956.3676	749.9338		4.2e-21	9039.0803	⊥	2.1e-21	
956.3968	1171.5755		1.7e-19	8994.5770	⊥	1.6e-20	
956.8418	1000.1505		4.2e-20	8779.3456	⊥	8.6e-21	
957.0761	655.1437		4.0e-21	8910.9435	⊥	2.9e-21	
957.3989	863.8601		2.0e-20	8605.1766	⊥	7.1e-21	
958.0058	755.4456		1.9e-20	8464.1588	⊥	1.1e-20	
958.0888	1138.1722		1.7e-19	8360.0103	⊥	1.7e-20	
958.4967	984.3138		7.9e-20	8169.4783	⊥	1.8e-20	
958.6177	669.2437		4.3e-21	8350.0699	⊥	3.7e-21	
958.9893	861.6717		7.7e-20	8015.2658	⊥	3.1e-20	
959.2030	600.8666		2.0e-21	8258.0496	⊥	2.5e-21	
959.5139	763.9947		1.9e-20	7890.5869	⊥	1.2e-20	
959.6524	1109.5454		3.3e-19	7730.3501	⊥	3.7e-20	
959.7394	546.9373		1.7e-21	8184.3282	⊥	3.3e-21	
960.0199	972.3013		3.3e-19	7562.8654	⊥	8.4e-20	
960.0325	686.4131		8.5e-21	7790.1177	⊥	8.6e-21	
960.4482	862.8099		7.0e-20	7427.5070	⊥	3.3e-20	
960.5182	625.1605		7.3e-21	7709.7126	⊥	1.1e-20	
960.8930	775.7261		3.6e-20	7318.4990	⊥	2.7e-20	
960.9520	577.3480		1.5e-21	7646.1710	⊥	3.6e-21	
961.0860	1085.4985		1.2e-18	7105.3300	⊥	1.5e-19	
961.3224	706.8979		3.6e-20	7231.3277	⊥	4.5e-20	
961.4110	964.0600		2.8e-19	6959.4111	⊥	8.2e-20	
961.7134	653.1278		5.9e-21	7162.4972	⊥	1.2e-20	
961.7762	867.3425		1.3e-19	6841.9437	⊥	6.9e-20	
962.0497	611.9772		2.1e-21	7109.3284	⊥	7.1e-21	
962.1444	790.8172		1.1e-19	6748.0585	⊥	1.0e-19	
962.2798	580.4775		1.2e-21	7069.1462	⊥	7.6e-21	
962.3884	1065.8671		1.0e-18	6484.7191	⊥	1.4e-19	
962.4890	730.9841		2.2e-20	6673.9742	⊥	3.5e-20	
962.6698	959.5663		4.5e-19	6359.0503	⊥	1.6e-19	
962.7907	685.1681		7.7e-21	6616.7879	⊥	2.1e-20	
962.9736	875.3682		3.9e-19	6258.6483	⊥	2.6e-19	
963.0575	651.9892		4.3e-21	6574.6673	⊥	2.3e-20	
963.2691	809.4812		7.7e-20	6179.4596	⊥	9.1e-20	
963.5342	759.0008		2.7e-20	6118.3675	⊥	5.8e-20	
963.5585	1050.5203		1.5e-18	5868.3228	⊥	2.4e-19	
963.7365	721.2642		1.5e-20	6072.6859	⊥	6.4e-20	
963.7962	958.8279		1.3e-18	5761.7491	⊥	5.3e-19	
963.9242	696.4339		1.4e-21	6042.0165	⊥	1.4e-20	
964.0412	887.0183		2.6e-19	5677.7236	⊥	2.1e-19	
964.2685	831.9689		8.9e-20	5612.9291	⊥	1.4e-19	
964.4670	791.5310		5.0e-20	5564.9930	⊥	1.6e-19	
964.5957	1039.3598		4.0e-18	5255.9823	⊥	7.8e-19	
964.6096	763.5831		4.5e-21	5531.8880	⊥	3.6e-20	
964.7902	961.8846		8.0e-19	5167.5058	⊥	4.1e-19	

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Table S5 – continued from previous page

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
964.9796	902.4589		2.8e-19	5099.3040	⊥	3.1e-19	
965.1377	858.3951		1.6e-19	5048.5821	⊥	3.7e-19	
965.2727	828.5256		1.4e-20	5013.9753	⊥	8.6e-20	
965.4994	1032.3214		2.4e-18	4647.5756	⊥	5.8e-19	
965.6520	968.8093		8.5e-19	4576.3508	⊥	5.7e-19	
965.7913	921.9405		4.7e-19	4523.5918	⊥	7.7e-19	
965.8991	889.7112		4.3e-20	4487.2388	⊥	1.9e-19	
965.9677	870.8782		2.5e-21	4465.9475	⊥	4.8e-20	
966.2692	1029.3749		2.5e-18	4043.0164	⊥	7.7e-19	
966.3799	979.6498		1.4e-18	3988.2917	⊥	1.4e-18	
966.4736	945.6048		1.3e-19	3950.7233	⊥	3.6e-19	
966.5324	925.6582		7.5e-21	3928.6856	⊥	9.8e-20	
966.9051	1030.5299		4.2e-18	3442.2588	⊥	1.8e-18	
966.9810	994.7477		3.8e-19	3403.6125	⊥	6.3e-19	
967.0308	973.8268		2.2e-20	3380.9901	⊥	1.9e-19	
967.4068	1035.8161		1.2e-18	2845.2812	⊥	8.6e-19	
967.4491	1014.0847		7.1e-20	2822.2564	⊥	3.3e-19	
967.7747	1045.3191		2.7e-19	2252.1120	⊥	4.9e-19	
1007.5405	1045.3191	⊥	5.7e-19	2252.1120		1.0e-18	
1027.0329	1035.8161	⊥	1.1e-18	2845.2812		7.7e-19	
1027.0470	1014.0847	⊥	4.1e-19	2822.2564		1.9e-18	
1046.3746	1030.5299	⊥	2.4e-18	3442.2588		1.1e-18	
1046.3880	994.7477	⊥	8.5e-19	3403.6125		1.4e-18	
1046.4006	973.8268	⊥	2.5e-19	3380.9901		2.1e-18	
1065.5638	1029.3749	⊥	1.1e-18	4043.0164		3.5e-19	
1065.5654	979.6498	⊥	2.0e-18	3988.2917		1.9e-18	
1065.5817	945.6048	⊥	5.3e-19	3950.7233		1.5e-18	
1065.5943	925.6582	⊥	1.4e-19	3928.6856		1.9e-18	
1084.5836	968.8093	⊥	9.0e-19	4576.3508		6.1e-19	
1084.5931	921.9405	⊥	1.2e-18	4523.5918		2.0e-18	
1084.5992	1032.3214	⊥	9.1e-19	4647.5756		2.2e-19	
1084.6098	889.7112	⊥	2.9e-19	4487.2388		1.3e-18	
1084.6237	870.8782	⊥	7.5e-20	4465.9475		1.4e-18	
1103.4305	902.4589	⊥	5.2e-19	5099.3040		5.8e-19	
1103.4343	961.8846	⊥	7.0e-19	5167.5058		3.6e-19	
1103.4412	858.3951	⊥	6.3e-19	5048.5821		1.5e-18	
1103.4698	828.5256	⊥	1.4e-19	5013.9753		8.7e-19	
1103.4795	1039.3598	⊥	1.3e-18	5255.9823		2.6e-19	
1103.4858	810.9190	⊥	3.7e-20	4993.5672		9.4e-19	
1122.0937	887.0183	⊥	3.9e-19	5677.7236		3.2e-19	
1122.1040	831.9689	⊥	2.6e-19	5612.9291		4.1e-19	
1122.1177	958.8279	⊥	9.7e-19	5761.7491		4.0e-19	
1122.1329	791.5310	⊥	3.0e-19	5564.9930		9.6e-19	
1122.1600	763.5831	⊥	6.6e-20	5531.8880		5.2e-19	
1122.1784	747.2868	⊥	1.6e-20	5512.4717		5.5e-19	
1122.2036	1050.5203	⊥	4.5e-19	5868.3228		7.3e-20	
1140.5780	809.4812	⊥	1.8e-19	6179.4596		2.1e-19	
1140.5792	875.3682	⊥	5.0e-19	6258.6483		3.3e-19	
1140.6037	759.0008	⊥	1.1e-19	6118.3675		2.4e-19	
1140.6274	721.2642	⊥	1.3e-19	6072.6859		5.3e-19	
1140.6320	959.5663	⊥	3.1e-19	6359.0503		1.1e-19	
1140.6792	696.4339	⊥	2.7e-20	6042.0165		2.8e-19	
1140.6997	681.5026	⊥	6.8e-21	6023.6695		2.9e-19	
1140.7706	1065.8671	⊥	2.8e-19	6484.7191		3.9e-20	
1158.8655	790.8172	⊥	2.2e-19	6748.0585		2.0e-19	
1158.8848	867.3425	⊥	1.5e-19	6841.9437		8.2e-20	
1158.8875	730.9841	⊥	7.3e-20	6673.9742		1.2e-19	
1158.9289	685.1681	⊥	4.5e-20	6616.7879		1.2e-19	
1158.9758	964.0600	⊥	1.8e-19	6959.4111		5.3e-20	

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Table S5 – continued from previous page

IR pump	THz freq.					
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.
1158.9850	651.9892	⊥	4.9e-20	6574.6673		2.6e-19
1159.0258	628.5864	⊥	1.0e-20	6545.4309		1.3e-19
1159.0473	615.0456	⊥	2.6e-21	6528.1959		1.3e-19
1159.1800	1085.4985	⊥	3.2e-19	7105.3300		4.0e-20
1176.9636	775.7261	⊥	6.0e-20	7318.4990		4.6e-20
1176.9767	706.8979	⊥	8.4e-20	7231.3277		1.0e-19
1177.0084	862.8099	⊥	8.1e-20	7427.5070		3.8e-20
1177.0212	653.1278	⊥	2.7e-20	7162.4972		5.4e-20
1177.0776	611.9772	⊥	1.6e-20	7109.3284		5.6e-20
1177.1108	580.4775	⊥	1.7e-20	7069.1462		1.1e-19
1177.1477	972.3013	⊥	1.9e-19	7562.8654		5.0e-20
1177.1978	561.4592	⊥	3.6e-21	7043.1848		5.5e-20
1177.4315	1109.5454	⊥	8.7e-20	7730.3501		9.6e-21
1194.8679	686.4131	⊥	2.1e-20	7790.1177		2.1e-20
1194.8697	763.9947	⊥	3.0e-20	7890.5869		2.0e-20
1194.9111	625.1605	⊥	2.8e-20	7709.7126		4.4e-20
1194.9479	861.6717	⊥	8.1e-20	8015.2658		3.3e-20
1194.9762	577.3480	⊥	8.9e-21	7646.1710		2.2e-20
1195.0464	540.7765	⊥	5.3e-21	7597.0436		2.2e-20
1195.1336	515.3808	⊥	5.6e-21	7561.2578		4.4e-20
1195.1464	984.3138	⊥	4.9e-20	8169.4783		1.1e-20
1195.1930	496.3563	⊥	1.2e-21	7536.2875		2.1e-20
1195.5251	1138.1722	⊥	4.5e-20	8360.0103		4.4e-21
1212.5581	669.2437	⊥	9.8e-21	8350.0699		8.4e-21
1212.5810	755.4456	⊥	2.8e-20	8464.1588		1.6e-20
1212.5951	600.8666	⊥	6.6e-21	8258.0496		8.5e-21
1212.6649	546.9373	⊥	8.6e-21	8184.3282		1.7e-20
1212.7013	863.8601	⊥	1.9e-20	8605.1766		6.8e-21
1212.7480	504.8735	⊥	2.7e-21	8126.0032		8.1e-21
1212.8300	472.7172	⊥	1.6e-21	8080.8596		7.8e-21
1212.8633	446.5256	⊥	1.6e-21	8046.0571		1.5e-20
1212.9709	1000.1505	⊥	2.3e-20	8779.3456		4.7e-21
1213.4613	1171.5755	⊥	4.3e-20	8994.5770		3.9e-21
1230.0439	655.1437	⊥	8.4e-21	8910.9435		6.2e-21
1230.0694	579.8942	⊥	2.8e-21	8807.1629		3.0e-21
1230.0949	749.9338	⊥	6.0e-21	9039.0803		3.0e-21
1230.1397	520.2789	⊥	1.9e-21	8723.3469		2.9e-21
1230.2321	473.3056	⊥	2.4e-21	8656.1027		5.6e-21
1230.2667	869.3362	⊥	8.2e-21	9197.2232		2.6e-21
1230.6204	1019.8937	⊥	2.0e-20	9392.5929		3.8e-21
1247.3221	643.9029	⊥	1.7e-21	9472.5283		1.1e-21
1247.3303	561.9381	⊥	2.2e-21	9356.7463		2.1e-21
1247.4088	747.3440	⊥	2.4e-21	9615.2434		1.1e-21
1247.6422	878.0883	⊥	6.6e-21	9791.4158		1.9e-21

Table S6: Laser lines of ¹⁵NH₃ in competition for a given MIR pumping in the ν₂ band. These lines are reported with asterisk in the rest of the article.

IR pump	THz freq.					
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.
677.9835	960.4703	⊥	5.2e-21	8722.7820		1.0e-21
679.5216	827.2044	⊥	3.8e-21	8551.2894		1.3e-21
680.9893	721.4841	⊥	5.3e-21	8412.7001		2.9e-21
682.3510	637.6352	⊥	1.8e-21	8300.7597		1.5e-21
698.8593	945.4435	⊥	1.3e-20	8115.0170		2.8e-21

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Table S6 – continued from previous page

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
700.1859	825.4977	⊥	1.9e-20	7963.2093		7.4e-21	
701.4363	730.2018	⊥	6.6e-21	7840.6877		4.2e-21	
702.5800	654.6790	⊥	4.5e-21	7742.1049		4.4e-21	
703.5964	595.1696	⊥	5.8e-21	7663.3095		8.9e-21	
704.4714	548.7980	⊥	1.8e-21	7601.1059		4.4e-21	
719.6587	934.1200	⊥	5.7e-20	7510.3917		1.4e-20	
720.7853	827.0081	⊥	2.1e-20	7377.1723		9.8e-21	
721.8312	742.0019	⊥	1.5e-20	7270.0567		1.1e-20	
722.7704	674.9452	⊥	2.0e-20	7184.5146		2.4e-20	
723.5852	622.6471	⊥	6.4e-21	7117.0472		1.3e-20	
724.2631	582.6811	⊥	3.8e-21	7064.9804		1.3e-20	
724.7878	552.1314	⊥	4.0e-21	7025.6923		2.5e-20	
740.3798	926.4495	⊥	6.1e-20	6908.8116		1.8e-20	
741.3189	831.8057	⊥	4.5e-20	6793.2227		2.4e-20	
742.1737	757.0629	⊥	6.3e-20	6700.9706		5.8e-20	
742.9225	698.7197	⊥	2.0e-20	6628.2622		3.2e-20	
743.5499	654.1073	⊥	1.2e-20	6572.1939		3.3e-20	
744.0483	621.8448	⊥	1.3e-20	6530.9238		6.8e-20	
744.4163	599.0989	⊥	2.8e-21	6502.3053		3.4e-20	
760.1956	1026.6663	⊥	1.4e-19	6434.0366		2.0e-20	
761.0208	922.4116	⊥	1.2e-19	6310.2136		4.1e-20	
761.7853	839.9900	⊥	1.8e-19	6211.4341		1.1e-19	
762.4634	775.5979	⊥	6.0e-20	6133.6230		6.9e-20	
763.0366	726.3306	⊥	3.6e-20	6073.6564		7.7e-20	
763.4871	689.5634	⊥	4.0e-20	6028.8830		1.6e-19	
763.8306	665.3558	⊥	8.5e-21	5998.7901		8.5e-20	
764.0287	650.8201	⊥	2.1e-21	5980.8113		8.7e-20	
780.9101	1011.9545	⊥	2.7e-19	5819.5382		4.3e-20	
781.5802	922.0162	⊥	4.4e-19	5714.5641		1.8e-19	
782.1839	851.6939	⊥	1.6e-19	5631.9086		1.3e-19	
782.7001	797.8583	⊥	9.9e-20	5568.2399		1.6e-19	
783.1148	758.3559	⊥	1.1e-19	5521.1737		3.5e-19	
783.4198	731.0736	⊥	2.4e-20	5488.6927		1.9e-19	
783.6022	715.1759	⊥	5.9e-21	5469.6489		1.9e-19	
801.5289	1001.3107	⊥	9.1e-19	5208.9842		1.7e-19	
802.0563	925.3043	⊥	3.6e-19	5121.8624		1.8e-19	
802.5137	867.0846	⊥	2.4e-19	5054.7805		2.7e-19	
802.8811	823.9835	⊥	2.8e-19	5004.9604		6.5e-19	
803.1579	794.7519	⊥	6.2e-20	4970.9484		3.7e-19	
803.3234	777.5447	⊥	1.5e-20	4950.9148		3.9e-19	
822.0498	994.6724	⊥	7.1e-19	4602.2531		1.7e-19	
822.4479	932.3515	⊥	5.4e-19	4532.1389		3.6e-19	
822.7744	886.4111	⊥	6.5e-19	4480.2496		1.0e-18	
823.0167	854.8450	⊥	1.5e-19	4444.5206		6.3e-19	
823.1646	836.4102	⊥	3.7e-20	4423.6044		7.0e-19	
842.4710	992.0120	⊥	1.0e-18	3999.2593		3.1e-19	
842.7529	943.2247	⊥	1.4e-18	3945.4198		1.3e-18	
842.9657	909.8183	⊥	3.3e-19	3908.4539		9.3e-19	
843.0961	890.2670	⊥	8.5e-20	3886.7909		1.1e-18	
862.7911	993.3404	⊥	2.5e-18	3399.9562		1.1e-18	
862.9735	958.2089	⊥	6.7e-19	3361.9305		1.1e-18	
863.0868	937.6801	⊥	1.8e-19	3339.6823		1.5e-18	
883.0085	998.6884	⊥	1.3e-18	2804.3225		9.0e-19	
883.1056	977.3450	⊥	3.8e-19	2781.6717		1.7e-18	
903.1219	1008.1427	⊥	7.7e-19	2212.3850		1.4e-18	
950.8697	832.0875		9.9e-21	9141.3948	⊥	3.1e-21	
951.6684	715.7032		4.7e-21	8985.9593	⊥	2.3e-21	
951.8915	960.4703		4.7e-20	8722.7820	⊥	9.4e-21	
952.4689	623.5677		4.5e-21	8860.2390	⊥	3.2e-21	

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Table S6 – continued from previous page

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
952.5630	827.2044		2.2e-20	8551.2894	⊥	7.8e-21	
953.2363	550.6156		1.0e-21	8758.5710	⊥	1.1e-21	
953.2677	721.4841		2.1e-20	8412.7001	⊥	1.2e-20	
953.5278	945.4435		9.6e-20	8115.0170	⊥	2.2e-20	
953.9629	637.6352		4.9e-21	8300.7597	⊥	4.1e-21	
954.1239	825.4977		9.0e-20	7963.2093	⊥	3.6e-20	
954.7365	730.2018		2.1e-20	7840.6877	⊥	1.3e-20	
955.0317	934.1200		3.6e-19	7510.3917	⊥	9.2e-20	
955.3295	654.6790		9.5e-21	7742.1049	⊥	9.4e-21	
955.5527	827.0081		8.5e-20	7377.1723	⊥	3.9e-20	
955.8772	595.1696		8.2e-21	7663.3095	⊥	1.3e-20	
956.0758	742.0019		3.8e-20	7270.0567	⊥	2.9e-20	
956.3615	548.7980		1.6e-21	7601.1059	⊥	4.0e-21	
956.4029	926.4495		3.2e-19	6908.8116	⊥	9.2e-20	
956.5704	674.9452		3.3e-20	7184.5146	⊥	4.0e-20	
956.8500	831.8057		1.4e-19	6793.2227	⊥	7.7e-20	
957.0148	622.6471		6.6e-21	7117.0472	⊥	1.3e-20	
957.2742	1026.6663		1.1e-18	6434.0366	⊥	1.5e-19	
957.2866	757.0629		1.2e-19	6700.9706	⊥	1.1e-19	
957.3935	582.6811		2.3e-21	7064.9804	⊥	7.8e-21	
957.6410	922.4116		5.0e-19	6310.2136	⊥	1.7e-19	
957.6577	552.1314		1.3e-21	7025.6923	⊥	8.3e-21	
957.6872	698.7197		2.5e-20	6628.2622	⊥	3.8e-20	
958.0161	839.9900		4.3e-19	6211.4341	⊥	2.8e-19	
958.0336	654.1073		8.6e-21	6572.1939	⊥	2.3e-20	
958.3339	621.8448		4.9e-21	6530.9238	⊥	2.5e-20	
958.3701	775.5979		8.6e-20	6133.6230	⊥	1.0e-19	
958.4344	1011.9545		1.7e-18	5819.5382	⊥	2.7e-19	
958.6817	726.3306		3.0e-20	6073.6564	⊥	6.3e-20	
958.7461	922.0162		1.4e-18	5714.5641	⊥	5.8e-19	
958.9207	689.5634		1.7e-20	6028.8830	⊥	7.0e-20	
959.0517	851.6939		2.8e-19	5631.9086	⊥	2.3e-19	
959.1319	665.3558		1.5e-21	5998.7901	⊥	1.5e-20	
959.3273	797.8583		1.0e-19	5568.2399	⊥	1.6e-19	
959.4609	1001.3107		4.5e-18	5208.9842	⊥	8.6e-19	
959.5625	758.3559		5.6e-20	5521.1737	⊥	1.8e-19	
959.7180	925.3043		8.9e-19	5121.8624	⊥	4.5e-19	
959.7310	731.0736		5.0e-21	5488.6927	⊥	4.0e-20	
959.9574	867.0846		3.1e-19	5054.7805	⊥	3.4e-19	
960.1544	823.9835		1.7e-19	5004.9604	⊥	4.1e-19	
960.3151	794.7519		1.6e-20	4970.9484	⊥	9.4e-20	
960.3530	994.6724		2.7e-18	4602.2531	⊥	6.3e-19	
960.5570	932.3515		9.4e-19	4532.1389	⊥	6.3e-19	
960.7353	886.4111		5.3e-19	4480.2496	⊥	8.4e-19	
960.8707	854.8450		4.8e-20	4444.5206	⊥	2.0e-19	
960.9555	836.4102		2.8e-21	4423.6044	⊥	5.3e-20	
961.1104	992.0120		2.8e-18	3999.2593	⊥	8.4e-19	
961.2619	943.2247		1.6e-18	3945.4198	⊥	1.5e-18	
961.3831	909.8183		1.4e-19	3908.4539	⊥	4.0e-19	
961.4586	890.2670		8.3e-21	3886.7909	⊥	1.1e-19	
961.7332	993.3404		4.6e-18	3399.9562	⊥	2.0e-18	
961.8378	958.2089		4.2e-19	3361.9305	⊥	6.9e-19	
961.9047	937.6801		2.5e-20	3339.6823	⊥	2.1e-19	
962.2208	998.6884		1.3e-18	2804.3225	⊥	9.4e-19	
962.2805	977.3450		7.9e-20	2781.6717	⊥	3.6e-19	
962.5738	1008.1427		3.0e-19	2212.3850	⊥	5.4e-19	
1002.2424	1008.1427	⊥	6.3e-19	2212.3850		1.1e-18	
1021.7011	998.6884	⊥	1.2e-18	2804.3225		8.5e-19	
1021.7324	977.3450	⊥	4.5e-19	2781.6717		2.0e-18	

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Table S6 – continued from previous page

IR pump	THz freq.						
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.	G _m [uG _m]
1041.0083	993.3404	⊥	2.7e-18	3399.9562		1.2e-18	
1041.0501	958.2089	⊥	9.4e-19	3361.9305		1.6e-18	
1041.0795	937.6801	⊥	2.8e-19	3339.6823		2.3e-18	
1060.1621	992.0120	⊥	1.2e-18	3999.2593		3.8e-19	
1060.2039	943.2247	⊥	2.2e-18	3945.4198		2.1e-18	
1060.2474	909.8183	⊥	5.9e-19	3908.4539		1.7e-18	
1060.2765	890.2670	⊥	1.6e-19	3886.7909		2.1e-18	
1079.1614	994.6724	⊥	1.0e-18	4602.2531		2.4e-19	
1079.1963	932.3515	⊥	1.0e-18	4532.1389		6.7e-19	
1079.2443	886.4111	⊥	1.3e-18	4480.2496		2.2e-18	
1079.2881	854.8450	⊥	3.2e-19	4444.5206		1.4e-18	
1079.3180	836.4102	⊥	8.4e-20	4423.6044		1.6e-18	
1098.0049	1001.3107	⊥	1.5e-18	5208.9842		2.8e-19	
1098.0212	925.3043	⊥	7.8e-19	5121.8624		3.9e-19	
1098.0664	867.0846	⊥	5.9e-19	5054.7805		6.4e-19	
1098.1154	823.9835	⊥	7.0e-19	5004.9604		1.7e-18	
1098.1691	794.7519	⊥	1.6e-19	4970.9484		9.6e-19	
1098.2006	777.5447	⊥	4.1e-20	4950.9148		1.0e-18	
1116.6781	922.0162	⊥	1.1e-18	5714.5641		4.4e-19	
1116.6915	1011.9545	⊥	5.0e-19	5819.5382		8.0e-20	
1116.7134	851.6939	⊥	4.3e-19	5631.9086		3.5e-19	
1116.7710	797.8583	⊥	2.9e-19	5568.2399		4.6e-19	
1116.8358	758.3559	⊥	3.3e-19	5521.1737		1.1e-18	
1116.8881	731.0736	⊥	7.4e-20	5488.6927		5.8e-19	
1116.9215	715.1759	⊥	1.8e-20	5469.6489		6.1e-19	
1135.1653	922.4116	⊥	3.4e-19	6310.2136		1.2e-19	
1135.1821	839.9900	⊥	5.7e-19	6211.4341		3.7e-19	
1135.2204	1026.6663	⊥	3.1e-19	6434.0366		4.3e-20	
1135.2379	775.5979	⊥	2.0e-19	6133.6230		2.3e-19	
1135.3090	726.3306	⊥	1.3e-19	6073.6564		2.7e-19	
1135.3684	689.5634	⊥	1.4e-19	6028.8830		5.9e-19	
1135.4431	665.3558	⊥	3.1e-20	5998.7901		3.1e-19	
1135.4778	650.8201	⊥	7.6e-21	5980.8113		3.2e-19	
1153.4702	831.8057	⊥	1.7e-19	6793.2227		9.0e-20	
1153.4815	926.4495	⊥	2.0e-19	6908.8116		5.9e-20	
1153.5174	757.0629	⊥	2.5e-19	6700.9706		2.3e-19	
1153.5940	698.7197	⊥	8.3e-20	6628.2622		1.3e-19	
1153.6788	654.1073	⊥	5.1e-20	6572.1939		1.4e-19	
1153.7675	621.8448	⊥	5.5e-20	6530.9238		2.9e-19	
1153.8316	599.0989	⊥	1.2e-20	6502.3053		1.5e-19	
1153.8665	585.9483	⊥	2.9e-21	6485.4297		1.5e-19	
1171.5758	827.0081	⊥	9.1e-20	7377.1723		4.2e-20	
1171.6070	742.0019	⊥	6.8e-20	7270.0567		5.1e-20	
1171.6251	934.1200	⊥	2.2e-19	7510.3917		5.5e-20	
1171.6833	674.9452	⊥	9.4e-20	7184.5146		1.1e-19	
1171.7796	622.6471	⊥	3.0e-20	7117.0472		6.0e-20	
1171.8773	582.6811	⊥	1.8e-20	7064.9804		6.1e-20	
1171.9433	552.1314	⊥	1.9e-20	7025.6923		1.2e-19	
1189.4969	825.4977	⊥	9.1e-20	7963.2093		3.6e-20	
1189.5039	730.2018	⊥	3.4e-20	7840.6877		2.2e-20	
1189.5741	654.6790	⊥	2.4e-20	7742.1049		2.4e-20	
1189.5952	945.4435	⊥	5.5e-20	8115.0170		1.2e-20	
1189.6771	595.1696	⊥	3.2e-20	7663.3095		4.9e-20	
1189.7912	548.7980	⊥	1.0e-20	7601.1059		2.5e-20	
1207.2057	721.4841	⊥	3.2e-20	8412.7001		1.8e-20	
1207.2315	827.2044	⊥	2.1e-20	8551.2894		7.5e-21	
1207.2632	637.6352	⊥	1.1e-20	8300.7597		9.3e-21	
1207.3906	960.4703	⊥	2.6e-20	8722.7820		5.2e-21	
1224.7097	715.7032	⊥	6.8e-21	8985.9593		3.3e-21	

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Table S6 – continued from previous page

IR pump	THz freq.					
	Freq. [cm ⁻¹]	Freq. [GHz]	Pola.	G _m [uG _m]	Freq. [GHz]	Pola.
1224.7474	623.5677	⊥	9.5e-21	8860.2390		6.9e-21
1224.7778	832.0875	⊥	9.3e-21	9141.3948		2.9e-21
1224.8482	550.6156	⊥	3.2e-21	8758.5710		3.4e-21

Table S7: Measured gain values (γ_0) for six pump/laser $^{14}\text{NH}_3$ transitions and comparison with their corresponding molecular gain factors (G_m). Details about measurements are reported in the section 4.5.

Pump line wavenumber [cm ⁻¹]	Laser line frequency [GHz]	G_m [uG _m]	γ_0 [m ⁻¹]
967.449	1014.0847	7.1E-20	0.040
965.499	1032.3214	2.4E-18	1.152
967.407	1035.8161	1.2E-18	0.751
967.738	1067.6770	4.6E-18	1.603
967.346	1073.0499	1.3E-17	4.007
966.815	1082.5928	7.5E-18	2.755

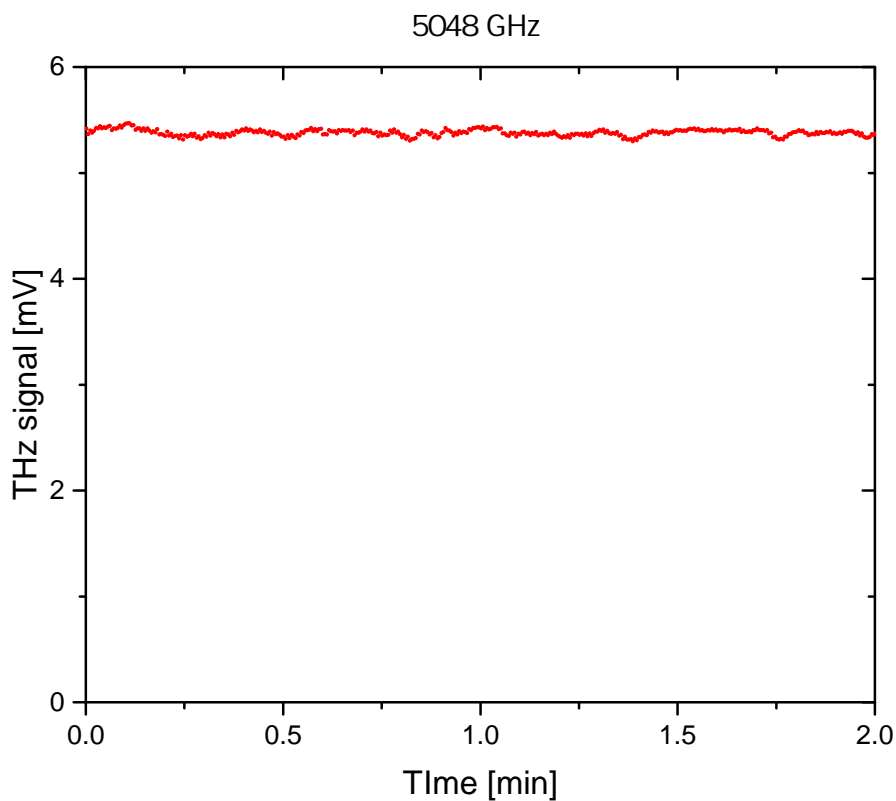


Figure S3: Example of power stability at 5048 GHz in free running (sR(6,3) transition of $^{14}\text{NH}_3$).

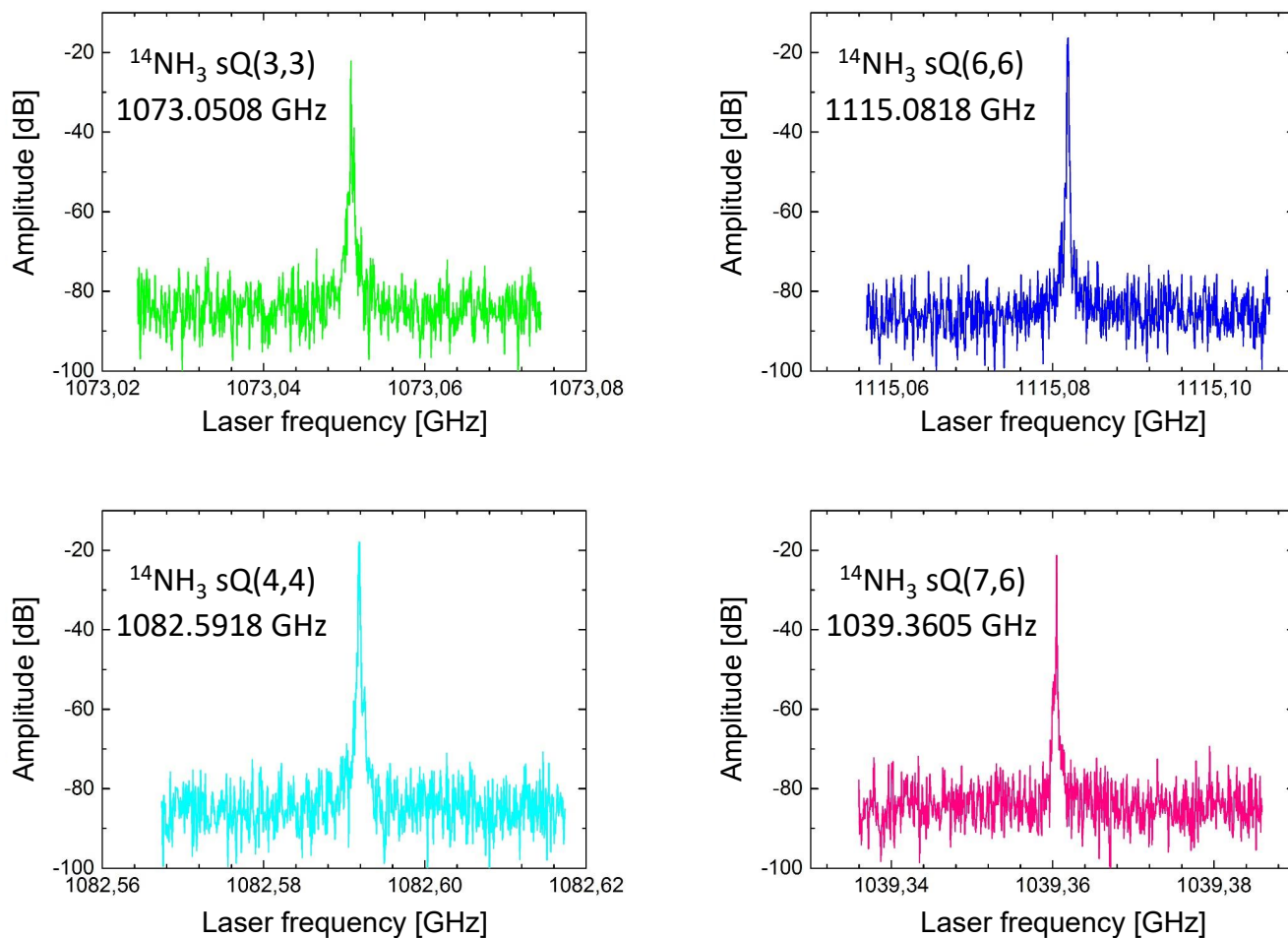


Figure S4: Four typical laser line spectra of $^{14}\text{NH}_3$ measured with a sub-harmonic Schottky diode mixer and an electrical spectrum analyzer. Resolution bandwidth: 100 kHz. The laser transition and the experimental frequency of the peak are indicated.