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Wavelengths, oscillator strengths and transition probabilities of the H_2 molecule for Lyman and Werner systems

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Summary. — Wavelengths, oscillator strengths and transition probabilities are calculated for the Lyman and Werner band systems of the H_2 molecule. Those calculations are performed for the first 15 rotational excited levels by including rotational coupling effects between the B and C electronic states. The expected accuracy should be better than 1 reciprocal centimeter for the wavenumbers.

Key words : molecular spectroscopy — hydrogen molecule — transition probabilities.

1. Introduction.

Lyman and Werner band systems of molecular hydrogen involve the ground $X^1\Sigma_g^+$ state and the two excited electronic states $B^1\Sigma_u^+$ and $C\,^1\Pi_u$ respectively. The corresponding potential energy curves have been accurately calculated with the inclusion of relativistic and non adiabatic corrections (Bishop and Shih, 1976; Kolos and Wolniewiecz, 1975; Kolos, 1975; Kolos and Rychlewski, 1976; Ford *et al.*, 1977; Dressler and Wolniewicz, 1986). Moreover the electronic dipole moments of the B-X and C-X electronic transitions have been recently recalculated by Dressler and Wolniewicz (1985).

The two excited states are furthermore coupled through a rotational non-adiabatic coupling (which is responsible of Λ doubling effect in the $C\,^1\Pi_u$ state) recently calculated by Ford (1975) and Wolniewicz and Dressler (1988). These theoretical new results are used here to predict accurate energies, oscillator strengths and transition probabilities of the H_2 Lyman and Werner band systems. Such data are indeed needed in various astrophysical contexts (interstellar matter, planetary and stellar atmospheres) and extend the widely used results of Allison and Dalgarno (1970) which were obtained without rotational angular momentum effects ($J'' = J' = 0$).

2. Theory.

The importance of rotational coupling has been clearly demonstrated by Abgrall *et al.* (1987) subsequently referred to as paper I when these authors compare theoretical and experimental ratios of selected line intensities belonging to the Lyman and Werner band systems obtained through high resolution photoelectric recording of the vuv emission spectrum at the National 10 m VUV spectrograph of the Meudon Observatory. The theoretical frame for obtaining the total rovibronic (i.e. electronic × vibrational × rotational) wave functions is described in paper I and is only recalled rapidly.

The total wave function Φ'' related to the ground electronic $X^1\Sigma_g^+$ state is written in a straightforward way in a Hund's case (a) molecular basis

$$\Phi''_e = \left(\frac{2J''+1}{4\pi}\right)^{1/2} \frac{1}{R} f_{x v'' J''}(R)\; D^{*J''}_{M\,0}(\varphi,\, \theta,\, 0)\; \Psi_x(r,\, R) \qquad (1)$$

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Ψ_x is the Born-Oppenheimer (BO) electronic wave function dependent on the electronic r and nuclear R coordinates where R is the internuclear distance ; $f_{xv''J''}$ is the corresponding vibrational wave function.
v'' and J'' are respectively the vibrational and rotational quantum numbers and D^J is a rotation matrix (Rose, 1957).
Φ''_e is an e type state according to the definition of Brown *et al.* (1975) from total parity properties.

The rovibronic functions related to the excited electronic $B^1\Sigma_u^+$ states are of e parity type whereas the $C^1\Pi_u$ electronic state contains both e and f parity type levels which are degenerate when the rotational coupling is neglected.

Excited states of e parity type are then obtained from the mixing of the two B and C electronic states through the $\frac{L^+}{\sqrt{2}}$ rotational coupling operator.

$$\Phi'_e = \left(\frac{2J'+1}{4\pi}\right)^{1/2} \frac{1}{R} \left\{ f_{Bv'J'}(R)\ D^{*J'}_{M\,0}(\varphi, \theta, 0)\ \Psi_B(r, R) + \frac{1}{\sqrt{2}} f_{C+v'J'}(R) \left[D^{*J'}_{M\,1}(\varphi, \theta, 0)\ \Psi_{C,1}(r, R) + D^{*J'}_{M-1}(\varphi, \theta, 0)\ \Psi_{C,-1}(r, R) \right] \right\} \quad (2)$$

The rovibronic functions related to f parity type are given by the following expression :

$$\Phi'_f = \left(\frac{2J'+1}{4\pi}\right)^{1/2} \frac{1}{R} \frac{1}{\sqrt{2}} f_{C-v'J'}(R) \times \times \left[D^{*J'}_{M\,1}(\varphi, \theta, 0)\ \Psi_{C,1}(r, R) - D^{*J'}_{M-1}(\varphi, \theta, 0)\ \Psi_{C,-1}(r, R) \right] \quad (3)$$

The normalization of Φ'_e is such that if $\eta_B = \int_0^\infty f^2_{B\,v'\,J'}(R)\ dR$ and
$\eta_C = \int_0^\infty f^2_{C\,v'J'}(R)\ dR$
$\eta_B + \eta_C = 1$
This has the immediate consequence that excited "e" states are not pure. Most often η_B and η_C are very close to 1 so that one state is unambiguously related to a specific electronic symmetry. However exceptions do occur where the assignment of the state (and the corresponding level) to B or C electronic state is ambiguous.
Whereas Φ''_e and Φ'_f are obtained from the resolution of the one dimensional Schrödinger nuclear equation, Φ'_e (i.e. f_B and f_C) is obtained from a coupled system of second order differential equations detailed in paper I.
One obtains at the same time the corresponding eigenvalues which give the energy levels values.

3. Calculations.

We have calculated the eigenfunctions and eigenvalues for all possible vibrational states and the first 15 rotational angular momenta involved in the Lyman and Werner band systems of molecular hydrogen by using the method described in paper I. Level energies which are not perturbed (i.e. f levels belonging to C^- and $J'' = 0$ e levels) are calculated with slightly adjusted potentials in order to agree with high resolution measurements within 1 cm^{-1} (Roncin *et al.*, 1984 ; Dabrowski, 1984 ; Launay and Roncin, 1988). The wavenumbers σ of the various transitions are obtained from the differences between lower and upper excited energy levels. The corresponding wavelengths in the vacuum are then calculated : $\lambda = \frac{1}{\sigma}$.
Molecular transitions are distributed into three branches depending on the value of $J' - J'' = \Delta J$ where $'$ and $''$ refer respectively to the excited and ground electronic states. P and R transitions ($\Delta J = -1$ and $\Delta J = +1$ respectively) connect only e type states whereas Q transitions ($\Delta J = 0$) connect the e type lower level to f type excited level.
According to paper I different expressions arise for the electronic dipole matrix element M involved for each branch which we define as M^P, M^Q, M^R for P, Q, R branches.

$$M^P = (J'+1)^{1/2} < f_{B\,v'\,J'} |M_{BX}| f_{x\,v''\,J''} > + J'^{1/2} < f_{C+\,v'\,J'} |M_{CX}| f_{x\,v'\,J'} >$$
$$M^Q = < f_{C-\,v'\,J'} |M_{CX}| f_{x\,v''\,J''} > \quad (4)$$
$$M^R = J'^{1/2} < f_{B\,v'\,J'} |M_{BX}| f_{x\,v''\,J''} > - (J'+1)^{1/2} < f_{C+\,v'\,J'} |M_{CX}| f_{X\,v''\,J''} >$$

where M_{BX} and M_{CX} are the electronic transition moments given by Dressler and Wolniewicz (1985).

Using M^α where α = P, Q, R, we can give general expressions for the line oscillator strength $f_{v'' J'', v' J'}$ and the emission transition probability $A_{v' J', v'' J''}$

$$f_{v'' J'', v' J'} = \frac{2}{3(2J''+1)} (E_{v' J'} - E_{v'' J''}) |M^\alpha|^2$$

where all quantities are in atomic units.

$$A_{v' J', v'' J''} = \frac{4}{3\hbar^4 c^3 (2J'+1)} (E_{v' J'} - E_{v'' J''})^3 |M^\alpha|^2$$

$$= \frac{2.14 \times 10^{10}}{(2J'+1)} (E_{v' J'} - E_{v'' J''})^3 |M^\alpha|^2$$

in s^{-1} with all quantities in atomic units.

4. Results.

Tables I, II, III give the level energy terms $T'_{v' J'}$ in reciprocal centimeters for the first 15 rotational angular momenta J' and all possible vibrational levels of the three excited electronic levels, B, C^+ and C^-. The origin is taken to be the ground rovibrational term of the ground state $X^1\Sigma^+$ g, $v'' = 0$, $J = 0$. The percentage of B character of the level which is defined as % B = $100\eta_B$ is also given in tables I and II relative to B and C^+ electronic states. As mentioned in paper I, the assignment to a specific electronic state is most often unambiguous. However, some cases arise where % B is close to 50 and it is then meaningless to specify the electronic state.

Oscillator strengths from $v'' = 0$ and emission probabilities in s^{-1} toward $v'' = 0$ are displayed in tables IV and V for B and C according to the labelling given in the tables I and II with the corresponding wavenumbers (in cm^{-1}) and wavelengths (in Å). The expected accuracy is better than 1 cm^{-1} for the wavenumbers. This has been verified by comparison with experimental spectra (Dabrowski, 1984 ;Roncin *et al.* 1984, Launay and Roncin, 1988).

These data extend in a more accurate way those compiled by Morton and Dinerstein (1976) for interstellar studies. The differences with earlier results of Allison and Dalgarno (1970) is of the order of a few percents. In unambiguous cases, results concerning transitions with excited vibrational levels belonging to the $X^1\Sigma_g^+$ electronic ground state can be obtained under request to the authors.

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TABLE I. — *Level energies in reciprocal centimeters for the B state and percentage of B character.*

	0	%B	1		2		3		4	
0	90203.23	.....	91521.39	.....	92803.01	.....	94049.96	.....	95263.02	.....
1	90242.10	100.	91558.30	100.	92838.27	99.99	94083.78	99.99	95295.51	99.99
2	90319.44	99.99	91631.80	99.99	92908.52	99.99	94151.15	99.98	95360.26	99.98
3	90434.53	99.98	91741.25	99.98	93013.17	99.97	94251.56	99.97	95456.80	99.96
4	90586.31	99.98	91885.72	99.97	93151.41	99.96	94384.26	99.95	95584.43	99.93
5	90773.36	99.97	92064.00	99.95	93322.14	99.94	94548.26	99.92	95742.24	99.90
6	90994.07	99.95	92274.66	99.94	93524.08	99.92	94742.38	99.90	95929.15	99.88
7	91246.55	99.94	92516.05	99.92	93755.75	99.90	94965.24	99.88	96143.89	99.85
8	91526.78	99.93	92786.36	99.91	94015.49	99.89	95215.34	99.86	96385.04	99.83
9	91833.59	99.93	93083.67	99.90	94301.55	99.87	95491.04	99.84	96651.08	99.81
10	92173.77	99.92	93405.96	99.89	94612.09	99.86	95790.61	99.83	96940.39	99.79
11	92532.10	99.91	93751.20	99.88	94945.20	99.85	96112.30	99.82	97251.30	99.78
12	92911.37	99.91	94117.34	99.88	95298.98	99.84	96454.29	99.81	97582.10	99.77
13	93309.45	99.91	94502.36	99.87	95671.52	99.84	96814.80	99.81	97931.09	99.77
14	93724.30	99.90	94904.33	99.87	96060.96	99.84	97192.04	99.80	98296.56	99.77

	5		6		7		8		9	
0	96442.96	.....	97590.31	.....	98705.55	.....	99789.43	.....	100842.20	.....
1	96474.23	99.96	97620.42	99.96	98734.48	99.96	99817.49	99.97	100869.11	99.95
2	96535.85	99.97	97680.43	99.96	98792.21	99.89	99873.45	99.92	100922.83	99.86
3	96626.48	99.94	97769.96	99.92	98878.45	99.82	99957.03	99.83	101003.13	99.78
4	96752.40	99.91	97888.42	99.89	98992.66	99.78	100067.86	99.62	101109.59	99.71
5	96904.45	99.88	98035.03	99.84	99134.14	99.74	100205.97	98.70	101241.59	99.64
6	97084.63	99.85	98208.85	99.81	99301.96	99.71	100387.76	57.30	101398.35	99.59
7	97291.74	99.82	98408.76	99.77	99495.11	99.68	100548.53	97.94	101578.96	99.52
8	97524.48	99.79	98633.52	99.74	99712.35	99.66	100760.10	99.18	101782.48	99.39
9	97781.39	99.77	98881.77	99.72	99952.40	99.65	100992.75	99.41	102006.45	98.72
10	98061.95	99.75	99152.06	99.70	100213.67	99.63	101245.96	99.49	102226.54	63.00
11	98361.56	99.74	99442.85	99.69	100495.30	99.63	101516.50	99.52	102511.42	98.69
12	98681.66	99.73	99752.70	99.68	100795.21	99.63	101809.01	99.55	102793.76	99.30
13	99019.55	99.73	100079.94	99.68	101112.12	99.63	102116.04	99.56	103091.47	99.43
14	99373.63	99.73	100423.05	99.69	101444.52	99.64	102436.17	99.58	103403.70	99.49

	10		11		12		13		14	
0	101864.52	.....	102856.74	.....	103819.32	.....	104752.52	.....	105657.40	.....
1	101890.63	99.92	102881.86	99.95	103844.33	99.71	104776.03	99.95	105686.86	69.21
2	101943.41	99.77	102932.02	99.86	103894.90	96.37	104822.96	99.86	105717.28	67.04
3	102022.29	99.27	103007.02	99.76	103976.06	86.21	104893.16	99.75	105787.18	95.45
4	102126.86	96.41	103106.51	99.67	104046.30	84.02	104986.35	99.61	105877.99	97.54
5	102224.73	61.73	103229.99	99.56	104172.84	96.32	105102.17	99.41	105990.11	96.35
6	102395.34	96.28	103376.83	99.43	104316.46	96.19	105240.33	99.02	106123.13	98.72
7	102572.46	96.53	103546.43	99.17	104480.63	96.77	105401.40	97.61	106276.38	98.90
8	102769.91	99.04	103736.97	96.06	104665.11	99.01	105596.86	81.08	106449.11	98.94
9	102987.76	99.23	103970.12	73.28	104869.13	99.08	105753.35	91.67	106640.65	98.81
10	103225.10	99.30	104164.73	96.14	105091.90	99.00	105976.22	97.73	106851.00	98.01
11	103480.88	99.27	104415.77	98.66	105333.27	98.25	106210.05	98.67	107088.73	87.22
12	103754.56	98.70	104680.53	99.10	105612.99	67.68	106458.39	98.93	107294.40	93.11
13	104032.27	91.05	104959.96	99.24	105848.28	97.56	106721.18	98.84	107555.27	98.18
14	104340.90	99.12	105253.43	99.17	106134.67	98.96	107000.64	95.89	107823.23	96.86

	15		16		17		18		19	
0	106534.25	.....	107383.63	.....	108206.17	.....	109002.15	.....	109771.71	.....
1	106556.29	99.95	107403.91	99.35	108226.89	99.93	109021.54	99.79	109791.23	99.88
2	106600.31	99.84	107445.22	98.89	108268.31	99.79	109060.52	99.53	109830.33	99.59
3	106666.19	99.69	107507.85	98.78	108330.40	99.51	109119.16	99.33	109889.30	96.82
4	106753.79	99.45	107591.55	98.82	108413.31	98.90	109197.36	99.20	109969.66	95.96
5	106863.04	96.95	107695.79	98.89	108518.18	96.82	109294.77	99.10	110082.85	74.72
6	106994.82	97.26	107819.95	98.93	108654.70	81.21	109410.96	96.97	110144.89	84.26
7	107158.96	82.78	107963.38	98.91	108742.94	83.42	109545.50	96.71	110284.11	95.35
8	107278.78	86.52	108125.53	98.71	108911.41	95.75	109698.45	97.92	110432.84	97.51
9	107474.83	96.66	108306.44	97.91	109087.50	97.78	109873.08	93.53	110595.73	98.15
10	107679.21	98.20	108511.11	91.71	109277.63	98.35	109990.26	61.77	110773.28	98.22
11	107897.80	98.62	108676.08	81.76	109482.43	98.36	110221.27	94.78	110966.12	97.35
12	108131.03	98.57	108918.06	96.87	109702.92	97.17	110436.46	97.74	111162.53	87.71
13	108380.37	96.84	109156.84	98.37	109960.05	70.96	110660.63	98.33	111353.30	88.47
14	108604.22	76.67	109409.83	98.65	110153.92	95.42	110896.31	97.91	111591.01	97.34

	20		21		22		23		24	
0	110515.10	.....	111233.17	.....	111926.96	.....	112596.01	.....	113240.03	.....
1	110533.36	99.86	111251.75	99.69	111944.10	99.91	112614.62	97.70	113256.02	99.92
2	110569.94	99.70	111289.32	98.59	111978.40	99.75	112656.67	80.51	113288.01	99.76
3	110624.85	99.51	111348.12	93.55	112029.64	99.56	112678.41	75.84	113335.99	99.52
4	110697.98	99.32	111445.21	56.69	112098.34	99.31	112750.75	92.66	113399.96	99.16
5	110789.10	99.12	111481.65	88.12	112183.82	98.95	112834.59	96.33	113480.06	98.44
6	110897.99	98.80	111592.02	95.59	112286.41	98.18	112932.86	97.58	113577.35	96.25
7	111024.75	98.00	111714.81	97.43	112407.68	95.43	113045.79	98.07	113699.43	83.37
8	111171.66	94.56	111852.08	98.05	112561.65	74.48	113173.16	98.15	113764.62	76.49
9	111364.83	60.30	112003.98	98.14	112646.59	85.93	113314.96	97.68	113916.23	94.17
10	111463.86	91.46	112170.80	97.50	112816.99	95.81	113472.97	95.05	114067.58	97.01
11	111655.63	96.93	112356.35	92.81	112991.52	97.54	113668.59	66.86	114228.26	97.59
12	111854.52	97.96	112486.04	68.31	113176.34	97.74	113780.53	91.23	114400.37	96.77
13	112064.44	97.84	112715.80	95.47	113374.08	95.92	113975.05	96.95	114592.32	86.64
14	112289.83	93.78	112930.96	97.82	113614.93	58.86	114173.10	97.79	114734.95	87.11

TABLE I (*continued*).

	25	%B	26		27		28		29	
0	113858.99	.....	114452.60	.....	115021.00	.....	115562.39	.....	116075.17	.....
1	113870.90	92.39	114467.43	99.91	115034.07	99.02	115575.98	99.89	116087.25	99.48
2	113900.15	94.46	114497.11	99.72	115061.04	96.37	115603.17	99.65	116111.81	98.96
3	113945.56	96.25	114541.67	99.40	115102.31	98.22	115644.05	99.18	116149.08	98.69
4	114006.36	97.31	114601.23	96.77	115157.74	98.29	115698.94	98.07	116199.02	98.58
5	114082.06	97.90	114676.46	97.12	115226.97	98.38	115769.42	94.19	116261.33	98.51
6	114172.22	98.19	114771.18	89.56	115309.59	98.36	115866.34	70.14	116335.69	98.33
7	114276.44	98.23	114811.49	59.01	115405.30	96.11	115906.89	82.20	116421.87	97.83
8	114394.51	97.69	114949.25	91.15	115514.16	97.21	116017.59	94.53	116520.33	96.09
9	114527.13	96.33	115079.04	96.19	115638.46	93.00	116132.85	96.84	116636.10	86.16
10	114681.65	85.60	115216.67	97.34	115801.86	57.14	116256.89	97.27	116699.93	73.05
11	114778.07	79.13	115364.52	97.16	115872.66	90.85	116391.06	96.13	116840.85	94.03
12	114958.00	95.27	115525.48	93.83	116027.50	96.44	116542.45	85.26	116975.30	96.82
13	115133.65	97.35	115622.30	54.21	116185.95	97.23	116643.81	83.50	117114.58	96.66
14	115316.31	97.15	115832.85	94.29	116353.07	95.16	116809.88	96.15	117265.10	88.72

	30		31		32		33		34	
0	116556.95	.....	117003.78	.....	117409.32	.....	117765.37	.....	118054.69	.....
1	116569.08	99.87	117014.34	99.53	117419.49	99.86	117773.65	99.46	118061.71	99.86
2	116593.36	99.57	117035.72	99.05	117439.83	99.53	117790.43	98.96	118075.65	99.53
3	116629.89	98.93	117068.09	98.76	117470.39	98.82	117815.74	98.72	118096.42	98.74
4	116679.14	97.22	117111.34	98.62	117511.56	96.61	117849.31	98.63	118124.22	95.87
5	116743.69	89.93	117165.17	98.50	117565.97	87.28	117890.67	98.53	118163.57	72.00
6	116765.89	53.81	117229.19	98.24	117588.95	63.96	117939.20	98.24	118181.28	88.85
7	116866.50	89.34	117303.17	97.51	117667.09	91.61	117994.42	97.26	118223.77	96.89
8	116960.71	95.59	117387.79	94.78	117742.54	96.22	118057.23	92.16	118265.67	96.17
9	117060.96	97.04	117491.38	75.36	117822.38	97.22	118088.00	62.16	118306.76	97.88
10	117166.99	96.99	117545.53	85.03	117907.36	96.59	118169.50	94.78	118347.81	86.62
11	117286.37	94.29	117656.26	95.58	118000.21	89.16	118237.46	97.59	118368.46	97.95
12	117430.17	63.44	117765.55	96.99	118059.75	81.74	118302.17	96.66		
13	117505.94	92.15	117876.60	95.10	118158.87	96.72	118340.33	72.63		
14	117640.04	96.98	117944.57	52.16	118018.19	52.08	118247.53	97.51		

	35		36		37	
0	118253.66	.....	118336.48	.....	118363.99	.....
1	118257.91	99.84	118338.00	97.73	118365.91	99.49
2	118266.25	99.66	118341.52	99.20	118367.23	94.96
3	118278.29	99.54	118346.56	99.56	118370.18	99.52
4	118293.31	99.43	118352.85	99.66	118373.73	99.65
5	118310.33	99.21	118360.01	99.62		
6	118326.36	98.14	118367.57	99.41		
7	118335.02	60.44	118354.85	51.94		
8	118358.39	98.81				
9	118372.51	99.23				

TABLE II. — *Level energies in reciprocal centimeters for the C^+ state and percentage of B character.*

	0	%B	1		2		3		4	
1	99152.14	0.07	101458.01	0.12	103629.39	0.35	105660.92	30.85	107580.67	0.73
2	99275.94	0.18	101575.44	0.37	103739.25	1.78	105783.54	13.12	107681.11	1.35
3	99460.13	0.32	101749.70	0.96	103896.91	14.08	105938.40	4.91	107829.27	1.76
4	99702.93	0.57	101977.31	3.91	104141.79	16.36	106143.97	3.07	108023.11	2.36
5	100001.60	1.53	102293.99	38.67	104404.01	4.29	106397.01	2.79	108259.22	4.42
6	100336.50	42.94	102611.09	4.24	104719.41	2.82	106693.54	4.14	108525.12	20.06
7	100768.59	2.38	102993.03	2.27	105079.76	3.68	107020.36	18.50	108897.43	18.08
8	101221.83	1.27	103420.92	2.88	105469.13	20.04	107450.30	14.90	109243.41	6.54
9	101720.84	1.73	103873.71	27.53	105956.46	9.55	107858.03	5.56	109627.82	8.95
10	102288.57	37.39	104421.69	4.75	106431.12	4.29	108301.43	10.26	110116.46	40.33
11	102851.41	1.79	104966.31	3.01	106934.51	14.22	108832.67	20.03	110537.61	8.13
12	103467.10	1.78	105524.73	33.21	107516.74	8.31	109328.11	6.10	111001.35	14.87
13	104127.51	9.36	106172.69	3.44	108083.19	5.00	109839.42	30.92	111546.56	13.93
14	104800.21	1.42	106806.37	5.05	108717.90	24.64	110449.12	6.77	112055.49	9.12

	5		6		7		8		9	
1	109361.67	0.33	111012.27	0.44	112529.45	2.41	113917.40	7.71	115153.76	1.09
2	109455.07	0.91	111096.04	1.75	112601.60	19.79	113992.98	5.86	115221.83	2.01
3	109592.87	1.92	111222.49	7.03	112749.52	24.73	114103.19	4.42	115321.46	2.65
4	109771.60	4.96	111366.66	44.16	112900.38	8.31	114246.61	4.02	115450.65	3.71
5	109977.41	26.36	111627.06	13.11	113090.67	5.40	114421.28	5.13	115605.79	7.55
6	110291.43	17.16	111865.92	6.44	113313.46	6.39	114620.31	12.48	115773.55	31.72
7	110581.59	6.86	112139.74	7.40	113557.49	18.89	114914.79	43.17	116033.60	19.13
8	110909.24	6.21	112428.43	27.86	113900.72	25.96	115149.09	11.90	116255.23	9.55
9	111239.22	41.99	112829.10	16.75	114195.00	9.83	115422.22	11.11	116494.80	17.25
10	111706.31	11.36	113180.91	9.49	114515.28	17.81	115690.32	46.02	116812.72	30.23
11	112114.86	10.61	113536.98	36.12	114927.12	24.12	116077.59	13.33	117072.97	11.96
12	112619.92	34.35	114013.03	12.37	115280.26	11.27	116395.09	18.69	117336.42	40.26
13	113055.14	8.92	114422.76	16.84	115734.45	49.06	116784.98	20.23	117679.46	13.33
14	113499.48	43.80	114910.92	16.10	116094.14	10.90	117118.53	15.57		

	10		11		12		13	
1	116237.27	0.66	117150.90	0.60	117870.07	0.68	118350.03	3.21
2	116297.10	1.48	117201.80	1.41	117910.31	1.52	118375.40	10.13
3	116384.72	2.40	117276.12	2.41	117968.56	2.59		
4	116497.88	4.24	117371.59	4.57	118042.28	5.64		
5	116631.86	11.63	117483.21	14.25	118123.86	29.87		
6	116841.64	48.01	117652.68	37.89	118242.11	14.66		
7	117003.19	13.21	117789.63	11.32				
8	117196.54	9.75	117945.81	12.01				
9	117396.32	27.86	118147.37	41.84				
10	117663.86	18.78	118299.19	23.10				
11	117883.86	15.89						
12	118147.33	23.53						
13	118384.92	44.85						

TABLE III. — *Level energies in reciprocal centimeters for* C^- *state.*

	0	1	2	3	4	5	6	7	8	9
1	99150.95	101456.81	103628.60	105668.25	107578.48	109360.26	111011.53	112530.24	113912.97	115151.95
2	99272.46	101572.03	103737.67	105771.27	107675.54	109451.34	111096.54	112609.07	113985.36	115217.46
3	99453.55	101743.72	103900.17	105924.73	107820.09	109586.97	111223.07	112726.37	114092.99	115314.75
4	99692.81	101970.54	104114.81	106127.38	108010.94	109765.96	111389.98	112881.00	114234.75	115442.71
5	99988.44	102250.75	104379.90	106377.63	108246.52	109986.81	111595.80	113071.52	114409.19	115599.87
6	100338.26	102582.26	104693.45	106673.52	108524.96	110247.66	111838.75	113296.17	114614.55	115784.44
7	100739.79	102962.68	105053.14	107012.83	108844.10	110546.44	112116.77	113552.93	114848.81	115994.33
8	101190.28	103389.35	105456.41	107393.10	109201.56	110880.79	112427.59	113839.54	115109.69	116227.18
9	101686.73	103859.42	105900.51	107811.67	109594.76	111248.20	112768.76	114153.54	115394.68	116480.38
10	102226.04	104369.87	106382.54	108265.75	110020.96	111645.99	113137.64	114492.30	115701.11	116751.10
11	102804.96	104917.60	106899.50	108752.44	110477.34	112071.41	113531.50	114853.04	116026.10	117036.25
12	103420.18	105499.41	107448.31	109268.75	110960.98	112521.60	113947.51	115232.87	116366.58	117332.44
13	104068.37	106112.09	108025.90	109811.70	111468.93	112993.67	114382.73	115628.77	116719.32	117635.95
14	104746.24	106752.46	108629.18	110378.26	111998.21	113484.71	114834.19	116037.63	117080.87	117942.56

	10	11	12	13	14
1	116236.03	117149.93	117869.31	118349.63	
2	116293.98	117199.35	117908.45	118374.58	
3	116379.92	117272.42	117965.91		
4	116492.70	117367.89	118040.17		
5	116630.78	117484.07	118129.13		
6	116792.30	117618.89	118230.05		
7	116975.05	117769.79	118339.30		
8	117176.48	117933.76			
9	117393.73	118107.20			
10	117623.53	118285.64			
11	117862.20				
12	118105.41				
13	118347.93				

TABLE IV. — *Transition wavenumbers* (σ *in* cm^{-1}), *wavelengths* (λ *in* Å), *oscillator strengths f and emission probabilities* (*A in* s^{-1}) *of* H_2 *Lyman system with the ground vibrational level* ($v'' = 0$). P : $\Delta J = J' - J'' = -1$; R : $\Delta J = J' - J'' = 1$.

v'	J'		σ	λ	f	A
0	0	P	90084.73	1110.0660	0.58E-03	0.94E+07
0	1	P	89887.75	1112.4987	0.70E-03	0.63E+07
0	1	R	90242.10	1108.1303	0.17E-02	0.30E+07
0	2	P	89613.90	1115.8983	0.74E-03	0.56E+07
0	2	R	90200.94	1108.6359	0.11E-02	0.35E+07
0	3	P	89265.75	1120.2504	0.76E-03	0.52E+07
0	3	R	90080.18	1110.1221	0.94E-03	0.36E+07
0	4	P	88846.10	1125.5418	0.76E-03	0.49E+07
0	4	R	89880.77	1112.5851	0.85E-03	0.36E+07
0	5	P	88358.60	1131.7517	0.75E-03	0.46E+07
0	5	R	89604.56	1116.0144	0.78E-03	0.34E+07
0	6	P	87806.50	1138.8679	0.74E-03	0.44E+07
0	6	R	89253.86	1120.3997	0.72E-03	0.32E+07
0	7	P	87194.82	1146.8571	0.71E-03	0.41E+07
0	7	R	88831.79	1125.7231	0.66E-03	0.30E+07
0	8	P	86526.81	1155.7112	0.68E-03	0.38E+07
0	8	R	88341.21	1131.9746	0.60E-03	0.28E+07
0	9	P	85807.78	1165.3955	0.65E-03	0.35E+07
0	9	R	87786.86	1139.1227	0.54E-03	0.25E+07
0	10	P	85041.74	1175.8931	0.61E-03	0.32E+07
0	10	R	87171.80	1147.1600	0.49E-03	0.23E+07
0	11	P	84233.49	1187.1763	0.57E-03	0.30E+07
0	11	R	86501.29	1156.0521	0.44E-03	0.20E+07
0	12	P	83367.55	1199.2198	0.54E-03	0.27E+07
0	12	R	85779.34	1165.7619	0.39E-03	0.18E+07
0	13	P	82508.51	1211.9962	0.50E-03	0.24E+07
0	13	R	85010.64	1176.3206	0.35E-03	0.16E+07
0	14	P	81600.64	1225.4806	0.47E-03	0.22E+07
0	14	R	84200.46	1187.6417	0.31E-03	0.14E+07
1	0	P	91402.89	1094.0573	0.20E-02	0.33E+08
1	1	P	91203.95	1096.4437	0.24E-02	0.22E+08
1	1	R	91558.30	1092.2002	0.58E-02	0.11E+08
1	2	P	90926.26	1099.7923	0.25E-02	0.20E+08
1	2	R	91513.30	1092.7373	0.38E-02	0.13E+08
1	3	P	90572.47	1104.0883	0.26E-02	0.18E+08
1	3	R	91386.90	1094.2488	0.33E-02	0.13E+08
1	4	P	90145.51	1109.3176	0.26E-02	0.17E+08
1	4	R	91180.18	1096.7296	0.31E-02	0.13E+08
1	5	P	89649.24	1115.4584	0.26E-02	0.17E+08
1	5	R	90895.22	1100.1678	0.29E-02	0.13E+08
1	6	P	89087.09	1122.4971	0.26E-02	0.16E+08
1	6	R	90534.45	1104.5519	0.27E-02	0.12E+08
1	7	P	88464.32	1130.3992	0.25E-02	0.15E+08
1	7	R	90101.29	1109.8620	0.25E-02	0.12E+08
1	8	P	87784.39	1139.1547	0.25E-02	0.14E+08
1	8	R	89598.79	1116.0865	0.23E-02	0.11E+08
1	9	P	87052.86	1148.7274	0.24E-02	0.13E+08
1	9	R	89031.94	1123.1925	0.22E-02	0.10E+08
1	10	P	86273.93	1159.0987	0.23E-02	0.12E+08
1	10	R	88403.99	1131.1707	0.20E-02	0.95E+07
1	11	P	85452.59	1170.2396	0.22E-02	0.12E+08
1	11	R	87720.39	1139.9658	0.18E-02	0.87E+07
1	12	P	84593.52	1182.1237	0.21E-02	0.11E+08
1	12	R	86985.31	1149.6194	0.17E-02	0.79E+07
1	13	P	83701.42	1194.7228	0.20E-02	0.10E+08
1	13	R	86203.75	1160.0423	0.16E-02	0.71E+07
1	14	P	82780.67	1208.0115	0.19E-02	0.93E+07
1	14	R	85380.51	1171.2275	0.14E-02	0.64E+07
2	0	P	92684.51	1078.9290	0.39E-02	0.68E+08
2	1	P	92483.92	1081.2690	0.47E-02	0.45E+08
2	1	R	92838.27	1077.1420	0.12E-01	0.22E+08
2	2	P	92202.96	1084.5637	0.50E-02	0.40E+08
2	2	R	92790.02	1077.7021	0.77E-02	0.27E+08
2	3	P	91844.39	1088.7981	0.52E-02	0.37E+08
2	3	R	92656.82	1079.2281	0.68E-02	0.28E+08
2	4	P	91411.20	1093.9579	0.52E-02	0.36E+08
2	4	R	92445.87	1081.7141	0.64E-02	0.28E+08
2	5	P	90907.36	1100.0207	0.52E-02	0.34E+08
2	5	R	92153.36	1085.1476	0.60E-02	0.28E+08
2	6	P	90336.51	1106.9721	0.52E-02	0.33E+08
2	6	R	91783.87	1089.5160	0.57E-02	0.27E+08
2	7	P	89704.02	1114.7773	0.52E-02	0.31E+08
2	7	R	91340.99	1094.7988	0.55E-02	0.26E+08
2	8	P	89013.52	1123.4249	0.51E-02	0.30E+08
2	8	R	90827.92	1100.9631	0.52E-02	0.25E+08
2	9	P	88270.74	1132.8782	0.50E-02	0.29E+08
2	9	R	90249.62	1108.0354	0.49E-02	0.24E+08
2	10	P	87480.06	1143.1177	0.49E-02	0.27E+08
2	10	R	89610.12	1115.9454	0.46E-02	0.22E+08
2	11	P	86646.59	1154.1135	0.47E-02	0.26E+08
2	11	R	88914.39	1124.6773	0.43E-02	0.21E+08
2	12	P	85775.16	1165.8387	0.46E-02	0.24E+08
2	12	R	88166.95	1134.2116	0.41E-02	0.19E+08
2	13	P	84870.56	1178.2645	0.44E-02	0.23E+08
2	13	R	87372.91	1144.5195	0.38E-02	0.18E+08
2	14	P	83937.30	1191.3655	0.43E-02	0.22E+08
2	14	R	86537.14	1155.5732	0.35E-02	0.16E+08
3	0	P	93931.46	1064.6061	0.60E-02	0.11E+09
3	1	P	93729.43	1066.9008	0.71E-02	0.70E+08
3	1	R	94083.76	1062.8825	0.16E-01	0.35E+08
3	2	P	93445.61	1070.1413	0.76E-02	0.62E+08
3	2	R	94032.65	1063.4604	0.12E-01	0.42E+08
3	3	P	93082.78	1074.3125	0.78E-02	0.58E+08
3	3	R	93897.21	1064.9943	0.11E-01	0.45E+08
3	4	P	92644.05	1079.4001	0.79E-02	0.55E+08
3	4	R	93678.72	1067.4783	0.10E-01	0.46E+08
3	5	P	92133.50	1085.3815	0.79E-02	0.53E+08
3	5	R	93379.48	1070.8991	0.96E-02	0.46E+08
3	6	P	91554.81	1092.2419	0.79E-02	0.51E+08
3	6	R	93002.17	1075.2437	0.93E-02	0.45E+08
3	7	P	90913.51	1099.9465	0.79E-02	0.49E+08
3	7	R	92550.48	1080.4914	0.89E-02	0.44E+08
3	8	P	90213.37	1108.4632	0.78E-02	0.47E+08
3	8	R	92027.77	1086.6265	0.86E-02	0.43E+08
3	9	P	89460.23	1117.8152	0.77E-02	0.45E+08
3	9	R	91439.31	1093.6216	0.83E-02	0.41E+08
3	10	P	88658.58	1127.9224	0.76E-02	0.44E+08
3	10	R	90788.64	1101.4594	0.79E-02	0.39E+08
3	11	P	87813.69	1138.7746	0.75E-02	0.42E+08
3	11	R	90081.49	1110.1060	0.76E-02	0.37E+08
3	12	P	86930.47	1150.3446	0.74E-02	0.40E+08
3	12	R	89322.26	1119.5418	0.72E-02	0.35E+08

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
3	13	P	86013.85	1162.6034	0.72E-02	0.38E+08
3	13	R	88516.19	1129.7369	0.69E-02	0.33E+08
3	14	P	85066.38	1175.5249	0.71E-02	0.37E+08
3	14	R	87666.22	1140.6642	0.65E-02	0.31E+08
4	0	P	95144.52	1051.0327	0.76E-02	0.14E+09
4	1	P	94941.16	1053.2840	0.91E-02	0.91E+08
4	1	R	95295.51	1049.3674	0.23E-01	0.47E+08
4	2	P	94654.72	1056.4714	0.96E-02	0.80E+08
4	2	R	95241.76	1049.9596	0.16E-01	0.56E+08
4	3	P	94286.02	1060.5802	0.98E-02	0.75E+08
4	3	R	95102.45	1051.4977	0.14E-01	0.60E+08
4	4	P	93844.22	1065.5956	0.10E-01	0.71E+08
4	4	R	94878.89	1053.9753	0.13E-01	0.62E+08
4	5	P	93327.48	1071.4957	0.10E-01	0.69E+08
4	5	R	94573.46	1057.3791	0.13E-01	0.63E+08
4	6	P	92741.56	1078.2650	0.10E-01	0.66E+08
4	6	R	94166.94	1061.6958	0.13E-01	0.63E+08
4	7	P	92092.16	1085.8688	0.10E-01	0.64E+08
4	7	R	93729.13	1066.9042	0.12E-01	0.62E+08
4	8	P	91383.07	1094.2946	0.10E-01	0.62E+08
4	8	R	93197.47	1072.9905	0.12E-01	0.61E+08
4	9	P	90620.27	1103.5059	0.99E-02	0.60E+08
4	9	R	92599.35	1079.9212	0.12E-01	0.60E+08
4	10	P	89805.36	1113.4821	0.99E-02	0.58E+08
4	10	R	91938.42	1087.6546	0.11E-01	0.58E+08
4	11	P	88952.69	1124.1931	0.98E-02	0.56E+08
4	11	R	91220.49	1096.2449	0.11E-01	0.55E+08
4	12	P	88056.26	1135.6115	0.98E-02	0.55E+08
4	12	R	90450.07	1105.5823	0.11E-01	0.53E+08
4	13	P	87130.14	1147.7084	0.97E-02	0.53E+08
4	13	R	89632.46	1115.6671	0.10E-01	0.51E+08
4	14	P	86172.90	1160.4577	0.97E-02	0.51E+08
4	14	R	88772.74	1126.4720	0.98E-02	0.48E+08
5	0	P	96324.46	1038.1579	0.87E-02	0.16E+09
5	1	P	96119.86	1040.3675	0.10E-01	0.11E+09
5	1	R	96474.23	1036.5462	0.27E-01	0.56E+08
5	2	P	95831.01	1043.5036	0.11E-01	0.93E+08
5	2	R	96418.05	1037.1502	0.18E-01	0.67E+08
5	3	P	95460.70	1047.5515	0.11E-01	0.86E+08
5	3	R	96275.13	1038.6898	0.16E-01	0.73E+08
5	4	P	95012.19	1052.4966	0.11E-01	0.82E+08
5	4	R	96046.86	1041.1585	0.16E-01	0.76E+08
5	5	P	94489.69	1058.3165	0.11E-01	0.79E+08
5	5	R	95735.67	1044.5427	0.15E-01	0.77E+08
5	6	P	93897.06	1064.9961	0.11E-01	0.76E+08
5	6	R	95344.42	1048.8291	0.15E-01	0.76E+08
5	7	P	93240.01	1072.5009	0.11E-01	0.74E+08
5	7	R	94876.98	1053.9964	0.15E-01	0.78E+08
5	8	P	92522.51	1080.8181	0.11E-01	0.72E+08
5	8	R	94336.91	1060.0305	0.15E-01	0.77E+08
5	9	P	91750.58	1089.9114	0.11E-01	0.70E+08
5	9	R	93729.66	1066.8982	0.14E-01	0.76E+08
5	10	P	90928.92	1099.7601	0.11E-01	0.68E+08
5	10	R	93058.98	1074.5873	0.14E-01	0.74E+08
5	11	P	90062.98	1110.3342	0.11E-01	0.67E+08
5	11	R	92330.78	1083.0625	0.14E-01	0.72E+08
5	12	P	89157.84	1121.6063	0.11E-01	0.65E+08
5	12	R	91549.63	1092.3037	0.14E-01	0.70E+08
5	13	P	88218.61	1133.5477	0.11E-01	0.63E+08
5	13	R	90720.94	1102.2814	0.13E-01	0.67E+08
5	14	P	87249.97	1146.1322	0.11E-01	0.62E+08
5	14	R	89849.81	1112.9684	0.13E-01	0.65E+08
6	0	P	97471.81	1025.9376	0.91E-02	0.17E+09
6	1	P	97266.07	1028.1078	0.11E-01	0.11E+09
6	1	R	97620.42	1024.3759	0.29E-01	0.61E+08
6	2	P	96974.89	1031.1948	0.11E-01	0.98E+08
6	2	R	97561.93	1024.9900	0.20E-01	0.74E+08
6	3	P	96601.18	1035.1841	0.11E-01	0.91E+08
6	3	R	97415.61	1026.5295	0.18E-01	0.81E+08
6	4	P	96148.21	1040.0610	0.11E-01	0.86E+08
6	4	R	97182.88	1028.9878	0.17E-01	0.85E+08
6	5	P	95620.27	1045.8033	0.11E-01	0.82E+08
6	5	R	96866.25	1032.3513	0.17E-01	0.87E+08
6	6	P	95021.26	1052.3956	0.11E-01	0.79E+08
6	6	R	96468.64	1036.6063	0.17E-01	0.89E+08
6	7	P	94357.03	1059.8044	0.11E-01	0.77E+08
6	7	R	95994.00	1041.7318	0.17E-01	0.89E+08
6	8	P	93631.55	1068.0161	0.11E-01	0.75E+08
6	8	R	95445.95	1047.7134	0.17E-01	0.89E+08
6	9	P	92850.96	1076.9948	0.12E-01	0.73E+08
6	9	R	94830.04	1054.5182	0.17E-01	0.89E+08
6	10	P	92020.03	1086.7200	0.12E-01	0.72E+08
6	10	R	94150.09	1062.1339	0.16E-01	0.87E+08
6	11	P	91144.27	1097.1616	0.12E-01	0.71E+08
6	11	R	93412.07	1070.5254	0.16E-01	0.86E+08
6	12	P	90228.88	1108.2926	0.12E-01	0.70E+08
6	12	R	92620.67	1079.6726	0.16E-01	0.84E+08
6	13	P	89279.00	1120.0843	0.12E-01	0.69E+08
6	13	R	91781.33	1089.5462	0.16E-01	0.82E+08
6	14	P	88299.39	1132.5107	0.12E-01	0.68E+08
6	14	R	90699.23	1100.1194	0.15E-01	0.79E+08
7	0	P	98587.05	1014.3321	0.90E-02	0.17E+09
7	1	P	98380.13	1016.4655	0.10E-01	0.11E+09
7	1	R	98734.46	1012.8174	0.30E-01	0.64E+08
7	2	P	98086.67	1019.5065	0.11E-01	0.94E+08
7	2	R	98673.71	1013.4412	0.20E-01	0.80E+08
7	3	P	97709.67	1023.4402	0.11E-01	0.86E+08
7	3	R	98524.10	1014.9801	0.19E-01	0.87E+08
7	4	P	97252.45	1028.2517	0.11E-01	0.81E+08
7	4	R	98287.12	1017.4273	0.18E-01	0.92E+08
7	5	P	96719.38	1033.9190	0.11E-01	0.78E+08
7	5	R	97965.36	1020.7690	0.18E-01	0.95E+08
7	6	P	96114.41	1040.4268	0.11E-01	0.75E+08
7	6	R	97561.77	1024.9917	0.18E-01	0.96E+08
7	7	P	95443.36	1047.7416	0.11E-01	0.73E+08
7	7	R	97080.35	1030.0746	0.18E-01	0.97E+08
7	8	P	94710.36	1055.8504	0.11E-01	0.72E+08
7	8	R	96524.76	1036.0034	0.18E-01	0.98E+08
7	9	P	93921.59	1064.7179	0.11E-01	0.71E+08
7	9	R	95900.67	1042.7456	0.18E-01	0.97E+08
7	10	P	93081.84	1074.3235	0.11E-01	0.70E+08
7	10	R	95211.90	1050.2889	0.18E-01	0.97E+08
7	11	P	92196.69	1084.6377	0.11E-01	0.69E+08
7	11	R	94464.49	1058.5989	0.18E-01	0.95E+08
7	12	P	91271.39	1095.6336	0.12E-01	0.69E+08
7	12	R	93663.18	1067.6554	0.17E-01	0.94E+08
7	13	P	90311.17	1107.2827	0.12E-01	0.69E+08
7	13	R	92813.51	1077.4294	0.17E-01	0.92E+08
7	14	P	89320.86	1119.5593	0.12E-01	0.68E+08
7	14	R	91920.70	1087.8942	0.17E-01	0.90E+08
8	0	P	99670.93	1003.3015	0.85E-02	0.17E+09
8	1	P	99463.14	1005.3976	0.99E-02	0.11E+09
8	1	R	99817.49	1001.8284	0.27E-01	0.59E+08
8	2	P	99167.91	1008.3907	0.10E-01	0.96E+08
8	2	R	99754.95	1002.4565	0.18E-01	0.72E+08
8	3	P	98788.25	1012.2662	0.11E-01	0.90E+08
8	3	R	99602.68	1003.9891	0.17E-01	0.78E+08
8	4	P	98327.65	1017.0080	0.11E-01	0.89E+08
8	4	R	99362.32	1006.4177	0.16E-01	0.80E+08
8	5	P	97791.21	1022.5868	0.13E-01	0.95E+08
8	5	R	99037.19	1009.7217	0.14E-01	0.75E+08
8	6	P	97200.19	1028.8046	0.23E-01	0.17E+09
8	6	R	98647.55	1013.7099	0.10E-02	0.58E+07
8	7	P	96496.80	1036.3038	0.71E-02	0.50E+08
8	7	R	98133.77	1019.0173	0.20E-01	0.11E+09
8	8	P	95758.13	1044.2977	0.86E-02	0.59E+08

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
8	8	R	97572.53	1024.8786	0.19E-01	0.11E+09
8	9	P	94961.94	1053.0534	0.92E-02	0.61E+08
8	9	R	96941.02	1031.5550	0.19E-01	0.10E+09
8	10	P	94113.93	1062.5419	0.96E-02	0.62E+08
8	10	R	96243.99	1039.0259	0.18E-01	0.10E+09
8	11	P	93219.89	1072.7324	0.10E-01	0.63E+08
8	11	R	95487.69	1047.2554	0.18E-01	0.10E+09
8	12	P	92285.19	1083.5975	0.10E-01	0.63E+08
8	12	R	94676.98	1056.2230	0.18E-01	0.10E+09
8	13	P	91315.10	1095.1091	0.11E-01	0.64E+08
8	13	R	93817.43	1065.9000	0.18E-01	0.98E+08
8	14	P	90314.51	1107.2417	0.11E-01	0.64E+08
8	14	R	92914.35	1076.2600	0.18E-01	0.97E+08
9	0	P	100723.70	992.8150	0.77E-02	0.16E+09
9	1	P	100514.76	994.8788	0.87E-02	0.97E+08
9	1	R	100869.11	991.3838	0.26E-01	0.59E+08
9	2	P	100217.29	997.8318	0.88E-02	0.82E+08
9	2	R	100804.33	992.0209	0.18E-01	0.74E+08
9	3	P	99834.35	1001.6592	0.87E-02	0.75E+08
9	3	R	100648.78	993.5540	0.17E-01	0.82E+08
9	4	P	99369.38	1006.3462	0.87E-02	0.70E+08
9	4	R	100404.05	995.9756	0.17E-01	0.87E+08
9	5	P	98826.83	1011.8710	0.87E-02	0.67E+08
9	5	R	100072.81	999.2725	0.16E-01	0.90E+08
9	6	P	98210.78	1018.2182	0.88E-02	0.65E+08
9	6	R	99658.14	1003.4303	0.16E-01	0.92E+08
9	7	P	97527.23	1025.3546	0.91E-02	0.65E+08
9	7	R	99164.20	1008.4284	0.16E-01	0.93E+08
9	8	P	96780.51	1033.2659	0.96E-02	0.67E+08
9	8	R	98594.91	1014.2511	0.16E-01	0.92E+08
9	9	P	95977.64	1041.9093	0.11E-01	0.75E+08
9	9	R	97956.72	1020.8590	0.15E-01	0.86E+08
9	10	P	95096.51	1051.5633	0.13E-04	0.67E+05
9	10	R	97226.57	1028.5254	0.24E-01	0.14E+09
9	11	P	94212.81	1061.4267	0.70E-02	0.45E+08
9	11	R	96480.61	1036.4777	0.19E-01	0.11E+09
9	12	P	93269.96	1072.1566	0.83E-02	0.52E+08
9	12	R	95661.75	1045.3499	0.19E-01	0.10E+09
9	13	P	92290.53	1083.5348	0.90E-02	0.55E+08
9	13	R	94792.86	1054.9318	0.18E-01	0.10E+09
9	14	P	91280.04	1095.5297	0.95E-02	0.57E+08
9	14	R	93879.88	1065.1909	0.18E-01	0.10E+09
10	0	P	101746.02	982.8394	0.68E-02	0.14E+09
10	1	P	101536.48	984.8677	0.82E-02	0.93E+08
10	1	R	101890.83	981.4426	0.21E-01	0.48E+08
10	2	P	101237.87	987.7727	0.89E-02	0.85E+08
10	2	R	101824.91	982.0780	0.14E-01	0.56E+08
10	3	P	100853.51	991.5371	0.99E-02	0.86E+08
10	3	R	101667.94	983.5942	0.12E-01	0.57E+08
10	4	P	100388.65	996.1286	0.13E-01	0.10E+09
10	4	R	101423.32	985.9666	0.82E-02	0.44E+08
10	5	P	99809.97	1001.9040	0.22E-03	0.17E+07
10	5	R	101055.95	989.5509	0.31E-01	0.17E+09
10	6	P	99207.77	1007.9856	0.38E-02	0.29E+08
10	6	R	100655.13	993.4913	0.20E-01	0.11E+09
10	7	P	98520.73	1015.0148	0.55E-02	0.40E+08
10	7	R	100157.70	998.4255	0.18E-01	0.10E+09
10	8	P	97767.94	1022.8302	0.63E-02	0.45E+08
10	8	R	99582.34	1004.1941	0.17E-01	0.99E+08
10	9	P	96956.95	1031.3856	0.69E-02	0.48E+08
10	9	R	98936.03	1010.7542	0.17E-01	0.98E+08
10	10	P	96093.07	1040.6578	0.75E-02	0.50E+08
10	10	R	98223.13	1018.0901	0.17E-01	0.96E+08
10	11	P	95182.27	1050.6158	0.82E-02	0.54E+08
10	11	R	97450.07	1026.1665	0.16E-01	0.94E+08
10	12	P	94230.74	1061.2248	0.99E-02	0.63E+08
10	12	R	96622.53	1034.9553	0.15E-01	0.87E+08
10	13	P	93231.32	1072.6009	0.22E-02	0.14E+08
10	13	R	95733.66	1044.5647	0.22E-01	0.12E+09
10	14	P	92217.24	1084.3959	0.70E-02	0.43E+08
10	14	R	94817.08	1054.6623	0.19E-01	0.10E+09
11	0	P	102738.24	973.3474	0.59E-02	0.12E+09
11	1	P	102527.51	975.3480	0.66E-02	0.77E+08
11	1	R	102881.86	971.9887	0.20E-01	0.47E+08
11	2	P	102226.48	978.2201	0.67E-02	0.66E+08
11	2	R	102813.52	972.6347	0.14E-01	0.59E+08
11	3	P	101638.24	981.9494	0.67E-02	0.60E+08
11	3	R	102652.67	974.1588	0.13E-01	0.66E+08
11	4	P	101366.30	986.5211	0.67E-02	0.56E+08
11	4	R	102400.97	976.5532	0.13E-01	0.70E+08
11	5	P	100815.23	991.9136	0.69E-02	0.55E+08
11	5	R	102061.21	979.8042	0.13E-01	0.72E+08
11	6	P	100189.26	998.1109	0.72E-02	0.55E+08
11	6	R	101636.62	983.8973	0.13E-01	0.73E+08
11	7	P	99494.70	1005.0786	0.78E-02	0.59E+08
11	7	R	101131.67	988.8099	0.12E-01	0.72E+08
11	8	P	98737.00	1012.7915	0.96E-02	0.70E+08
11	8	R	100551.40	994.5162	0.11E-01	0.64E+08
11	9	P	97939.31	1021.0405	0.22E-01	0.16E+09
11	9	R	99918.39	1000.8168	0.20E-02	0.12E+08
11	10	P	97032.70	1030.5804	0.27E-02	0.18E+08
11	10	R	99162.76	1008.4431	0.19E-01	0.11E+09
11	11	P	96117.16	1040.3969	0.48E-02	0.32E+08
11	11	R	98384.96	1016.4155	0.17E-01	0.10E+09
11	12	P	95155.71	1050.8981	0.58E-02	0.38E+08
11	12	R	97548.50	1025.1311	0.16E-01	0.96E+08
11	13	P	94159.02	1062.0332	0.67E-02	0.42E+08
11	13	R	96661.35	1034.5397	0.16E-01	0.93E+08
11	14	P	93129.77	1073.7706	0.78E-02	0.48E+08
11	14	R	95729.61	1044.6089	0.16E-01	0.90E+08
12	0	P	103700.82	964.3125	0.50E-02	0.11E+09
12	1	P	103489.96	966.2771	0.65E-02	0.77E+08
12	1	R	103844.33	962.9799	0.13E-01	0.31E+08
12	2	P	103189.36	969.0922	0.81E-02	0.81E+08
12	2	R	103776.40	963.6102	0.70E-02	0.30E+08
12	3	P	102807.26	972.6938	0.14E-01	0.12E+09
12	3	R	103621.71	965.0488	0.15E-02	0.79E+07
12	4	P	102306.09	977.4589	0.40E-03	0.34E+07
12	4	R	103340.76	967.6724	0.23E-01	0.13E+09
12	5	P	101758.06	982.7230	0.26E-02	0.21E+08
12	5	R	103004.06	970.8356	0.16E-01	0.92E+08
12	6	P	101128.89	988.8371	0.36E-02	0.29E+08
12	6	R	102576.25	974.8845	0.14E-01	0.84E+08
12	7	P	100426.90	995.7294	0.42E-02	0.32E+08
12	7	R	102065.87	979.7595	0.13E-01	0.81E+08
12	8	P	99663.14	1003.3800	0.47E-02	0.35E+08
12	8	R	101477.54	985.4398	0.13E-01	0.79E+08
12	9	P	98835.32	1011.7533	0.53E-02	0.38E+08
12	9	R	100817.40	991.8922	0.13E-01	0.76E+08
12	10	P	97959.87	1020.8262	0.61E-02	0.43E+08
12	10	R	100089.93	999.1016	0.12E-01	0.75E+08
12	11	P	97034.66	1030.5595	0.79E-02	0.54E+08
12	11	R	99302.46	1007.0243	0.11E-01	0.68E+08
12	12	P	96089.17	1040.7001	0.24E-01	0.16E+09
12	12	R	98480.96	1015.4248	0.16E-02	0.96E+07
12	13	P	95047.34	1052.1073	0.29E-02	0.19E+08
12	13	R	97549.67	1025.1188	0.17E-01	0.10E+09
12	14	P	94011.01	1063.7052	0.46E-02	0.29E+08
12	14	R	96610.65	1035.0804	0.16E-01	0.93E+08
13	0	P	104634.02	955.7121	0.42E-02	0.92E+08
13	1	P	104421.68	957.6556	0.48E-02	0.56E+08
13	1	R	104776.03	954.4168	0.14E-01	0.34E+08
13	2	P	104117.42	960.4540	0.49E-02	0.50E+08
13	2	R	104704.46	955.0691	0.98E-02	0.43E+08
13	3	P	103724.38	964.0935	0.50E-02	0.46E+08
13	3	R	104538.81	956.5825	0.91E-02	0.48E+08

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
13	4	P	103246.14	968.5592	0.51E-02	0.44E+08
13	4	R	104280.81	958.9492	0.89E-02	0.50E+08
13	5	P	102687.41	973.8292	0.54E-02	0.45E+08
13	5	R	103933.39	962.1547	0.87E-02	0.51E+08
13	6	P	102052.76	979.8853	0.60E-02	0.48E+08
13	6	R	103500.12	966.1825	0.82E-02	0.50E+08
13	7	P	101349.67	986.6830	0.75E-02	0.59E+08
13	7	R	102986.64	970.9997	0.70E-02	0.43E+08
13	8	P	100594.89	994.0863	0.16E-01	0.12E+09
13	8	R	102409.29	976.4739	0.18E-02	0.11E+08
13	9	P	99722.54	1002.7823	0.56E-03	0.41E+07
13	9	R	101701.62	983.2685	0.17E-01	0.10E+09
13	10	P	98844.19	1011.6933	0.25E-02	0.18E+08
13	10	R	100974.25	990.3515	0.14E-01	0.85E+08
13	11	P	97911.44	1021.3311	0.35E-02	0.25E+08
13	11	R	100179.24	998.2108	0.13E-01	0.79E+08
13	12	P	96934.57	1031.6237	0.44E-02	0.30E+08
13	12	R	99326.36	1006.7821	0.13E-01	0.76E+08
13	13	P	95920.24	1042.5329	0.55E-02	0.36E+08
13	13	R	98422.57	1016.0271	0.12E-01	0.72E+08
13	14	P	94876.98	1053.9965	0.96E-02	0.61E+08
13	14	R	97476.82	1025.6649	0.93E-02	0.55E+08
14	0	P	105536.90	947.5179	0.35E-02	0.78E+08
14	1	P	105334.51	949.3565	0.93E-02	0.11E+09
14	1	R	105688.86	946.1735	0.14E-02	0.35E+07
14	2	P	105011.74	952.2745	0.68E-03	0.70E+07
14	2	R	105598.78	946.9807	0.19E-01	0.87E+08
14	3	P	104618.40	955.8548	0.17E-02	0.16E+08
14	3	R	105432.83	948.4712	0.13E-01	0.68E+08
14	4	P	104137.76	960.2663	0.23E-02	0.20E+08
14	4	R	105172.45	950.8194	0.11E-01	0.62E+08
14	5	P	103575.35	965.4807	0.26E-02	0.22E+08
14	5	R	104821.33	954.0043	0.10E-01	0.60E+08
14	6	P	102935.56	971.4816	0.29E-02	0.24E+08
14	6	R	104382.92	958.0111	0.95E-02	0.59E+08
14	7	P	102224.65	978.2376	0.33E-02	0.26E+08
14	7	R	103861.62	962.8196	0.93E-02	0.58E+08
14	8	P	101447.14	985.7350	0.37E-02	0.28E+08
14	8	R	103261.54	968.4148	0.90E-02	0.57E+08
14	9	P	100609.84	993.9386	0.43E-02	0.32E+08
14	9	R	102588.92	974.7642	0.87E-02	0.55E+08
14	10	P	99718.97	1002.8182	0.57E-02	0.41E+08
14	10	R	101849.03	981.8454	0.78E-02	0.49E+08
14	11	P	98790.12	1012.2470	0.13E-01	0.89E+08
14	11	R	101057.92	989.5316	0.35E-02	0.22E+08
14	12	P	97770.58	1022.8026	0.42E-03	0.29E+07
14	12	R	100162.37	998.3790	0.16E-01	0.95E+08
14	13	P	96754.33	1033.5455	0.23E-02	0.15E+08
14	13	R	99256.66	1007.4891	0.13E-01	0.79E+08
14	14	P	95699.57	1044.9368	0.33E-02	0.22E+08
14	14	R	98299.41	1017.3001	0.12E-01	0.74E+08
15	0	P	106415.75	939.7106	0.29E-02	0.65E+08
15	1	P	106201.94	941.6024	0.33E-02	0.42E+08
15	1	R	106556.29	938.4711	0.94E-02	0.24E+08
15	2	P	105894.77	944.3337	0.35E-02	0.37E+08
15	2	R	106481.81	939.1275	0.65E-02	0.29E+08
15	3	P	105497.41	947.8905	0.36E-02	0.35E+08
15	3	R	106311.84	940.6290	0.60E-02	0.32E+08
15	4	P	105013.58	952.2578	0.39E-02	0.35E+08
15	4	R	106048.25	942.9670	0.57E-02	0.33E+08
15	5	P	104448.28	957.4117	0.43E-02	0.37E+08
15	5	R	105694.26	946.1252	0.53E-02	0.32E+08
15	6	P	103807.25	963.3238	0.55E-02	0.46E+08
15	6	R	105254.61	950.0771	0.43E-02	0.27E+08
15	7	P	103107.23	969.8641	0.11E-01	0.87E+08
15	7	R	104744.20	954.7068	0.11E-02	0.70E+07
15	8	P	102276.81	977.7388	0.33E-04	0.26E+06
15	8	R	104091.21	960.6959	0.14E-01	0.87E+08
15	9	P	101444.02	985.7653	0.13E-02	0.96E+07
15	9	R	103423.10	966.9020	0.10E-01	0.66E+08
15	10	P	100547.18	994.5580	0.21E-02	0.16E+08
15	10	R	102677.24	973.9257	0.95E-02	0.60E+08
15	11	P	99599.19	1004.0243	0.28E-02	0.20E+08
15	11	R	101866.99	981.6723	0.90E-02	0.57E+08
15	12	P	98607.21	1014.1246	0.37E-02	0.26E+08
15	12	R	100999.00	990.1088	0.85E-02	0.53E+08
15	13	P	97579.43	1024.8061	0.60E-02	0.41E+08
15	13	R	100081.76	999.1830	0.70E-02	0.44E+08
15	14	P	96480.56	1036.4782	0.88E-03	0.58E+07
15	14	R	99060.40	1009.2814	0.18E-01	0.11E+09
16	0	P	107265.13	932.2694	0.24E-02	0.55E+08
16	1	P	107049.56	934.1467	0.22E-02	0.28E+08
16	1	R	107403.91	931.0648	0.11E-01	0.27E+08
16	2	P	106739.66	936.8587	0.20E-02	0.22E+08
16	2	R	107326.72	931.7344	0.74E-02	0.34E+08
16	3	P	106339.07	940.3681	0.20E-02	0.19E+08
16	3	R	107153.50	933.2406	0.68E-02	0.37E+08
16	4	P	105851.34	944.7212	0.20E-02	0.19E+08
16	4	R	106886.01	935.5762	0.65E-02	0.39E+08
16	5	P	105281.03	949.8388	0.21E-02	0.19E+08
16	5	R	106527.01	938.7291	0.63E-02	0.39E+08
16	6	P	104632.36	955.7271	0.23E-02	0.19E+08
16	6	R	106079.74	942.6871	0.62E-02	0.39E+08
16	7	P	103911.65	962.3560	0.26E-02	0.21E+08
16	7	R	105548.62	947.4307	0.60E-02	0.39E+08
16	8	P	103123.56	969.7106	0.30E-02	0.24E+08
16	8	R	104937.96	952.9440	0.58E-02	0.37E+08
16	9	P	102275.63	977.7501	0.39E-02	0.30E+08
16	9	R	104254.71	959.1893	0.52E-02	0.34E+08
16	10	P	101379.08	986.3968	0.73E-02	0.55E+08
16	10	R	103509.14	966.0983	0.30E-02	0.20E+08
16	11	P	100377.47	996.2395	0.18E-03	0.13E+07
16	11	R	102645.27	974.2290	0.13E-01	0.86E+08
16	12	P	99394.24	1006.0946	0.95E-03	0.67E+07
16	12	R	101786.03	982.4531	0.99E-02	0.63E+08
16	13	P	98357.90	1016.6952	0.19E-02	0.13E+08
16	13	R	100860.23	991.4711	0.90E-02	0.57E+08
16	14	P	97286.17	1027.8953	0.27E-02	0.18E+08
16	14	R	99886.01	1001.1412	0.85E-02	0.53E+08
17	0	P	108087.67	925.1749	0.19E-02	0.46E+08
17	1	P	107872.54	927.0200	0.23E-02	0.30E+08
17	1	R	108226.89	923.9848	0.61E-02	0.16E+08
17	2	P	107562.77	929.6897	0.25E-02	0.27E+08
17	2	R	108149.81	924.6434	0.41E-02	0.19E+08
17	3	P	107161.62	933.1699	0.27E-02	0.26E+08
17	3	R	107976.05	926.1313	0.37E-02	0.20E+08
17	4	P	106673.10	937.4435	0.31E-02	0.28E+08
17	4	R	107707.77	928.4381	0.33E-02	0.20E+08
17	5	P	106103.42	942.4767	0.40E-02	0.35E+08
17	5	R	107349.40	931.5376	0.25E-02	0.16E+08
17	6	P	105467.13	948.1627	0.76E-02	0.65E+08
17	6	R	106914.49	935.3269	0.44E-03	0.28E+07
17	7	P	104691.21	955.1900	0.10E-07	0.86E+02
17	7	R	106328.18	940.4844	0.99E-02	0.65E+08
17	8	P	103909.44	962.3765	0.70E-03	0.56E+07
17	8	R	105723.84	945.8605	0.73E-02	0.48E+08
17	9	P	103056.69	970.3397	0.13E-02	0.10E+08
17	9	R	105035.77	952.0566	0.66E-02	0.43E+08
17	10	P	102145.60	978.9947	0.18E-02	0.14E+08
17	10	R	104275.66	958.9966	0.62E-02	0.41E+08
17	11	P	101183.82	988.3003	0.24E-02	0.18E+08
17	11	R	103451.62	966.6354	0.58E-02	0.38E+08
17	12	P	100179.10	998.2122	0.37E-02	0.27E+08
17	12	R	102570.89	974.9355	0.50E-02	0.32E+08
17	13	P	99159.11	1008.4802	0.13E-01	0.93E+08
17	13	R	101661.44	983.6571	0.56E-03	0.36E+07
17	14	P	98030.26	1020.0932	0.33E-03	0.22E+07
17	14	R	100630.10	993.7385	0.10E-01	0.63E+08
18	0	P	108883.65	918.4116	0.16E-02	0.38E+08
18	1	P	108667.19	920.2409	0.17E-02	0.22E+08
18	1	R	109021.54	917.2499	0.61E-02	0.16E+08
18	2	P	108354.98	922.8926	0.16E-02	0.18E+08
18	2	R	108942.02	917.9195	0.44E-02	0.21E+08
18	3	P	107950.38	926.3515	0.16E-02	0.16E+08
18	3	R	108764.81	919.4150	0.41E-02	0.23E+08

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
18	4	P	107457.15	930.6035	0.16E-02	0.15E+08
18	4	R	108491.82	921.7285	0.40E-02	0.25E+08
18	5	P	106880.01	935.6286	0.16E-02	0.15E+08
18	5	R	108125.99	924.8470	0.39E-02	0.25E+08
18	6	P	106223.39	941.4122	0.18E-02	0.16E+08
18	6	R	107670.75	928.7573	0.39E-02	0.25E+08
18	7	P	105493.77	947.9233	0.21E-02	0.17E+08
18	7	R	107130.74	933.4389	0.37E-02	0.25E+08
18	8	P	104696.48	955.1419	0.26E-02	0.22E+08
18	8	R	106510.88	938.8712	0.33E-02	0.22E+08
18	9	P	103842.27	962.9989	0.44E-02	0.35E+08
18	9	R	105821.35	944.9689	0.22E-02	0.15E+08
18	10	P	102856.23	972.2119	0.16E-02	0.12E+08
18	10	R	104988.29	952.4872	0.11E-01	0.71E+08
18	11	P	101922.66	981.1361	0.30E-03	0.23E+07
18	11	R	104190.46	959.7808	0.73E-02	0.46E+08
18	12	P	100912.64	990.9561	0.99E-03	0.73E+07
18	12	R	103304.43	966.0127	0.64E-02	0.42E+08
18	13	P	99859.69	1001.4051	0.16E-02	0.12E+08
18	13	R	102362.02	976.9248	0.59E-02	0.38E+08
18	14	P	98772.65	1012.4260	0.26E-02	0.18E+08
18	14	R	101372.49	986.4609	0.53E-02	0.34E+08
19	0	P	109653.21	911.9660	0.13E-02	0.31E+08
19	1	P	109436.88	913.7688	0.16E-02	0.21E+08
19	1	R	109791.23	910.8196	0.38E-02	0.10E+08
19	2	P	109124.79	916.3821	0.18E-02	0.20E+08
19	2	R	109711.83	911.4758	0.24E-02	0.12E+08
19	3	P	108720.52	919.7896	0.21E-02	0.21E+08
19	3	R	109534.95	912.9506	0.20E-02	0.11E+08
19	4	P	108229.45	923.9630	0.28E-02	0.27E+08
19	4	R	109264.12	915.2136	0.13E-02	0.82E+07
19	5	P	107668.09	928.7803	0.56E-02	0.51E+08
19	5	R	108914.07	918.1550	0.39E-04	0.25E+06
19	6	P	106957.32	934.9524	0.60E-05	0.53E+05
19	6	R	108404.66	922.4694	0.66E-02	0.44E+08
19	7	P	106232.36	941.3326	0.45E-03	0.38E+07
19	7	R	107869.35	927.0474	0.49E-02	0.33E+08
19	8	P	105430.87	948.4888	0.82E-03	0.68E+07
19	8	R	107245.27	932.4421	0.44E-02	0.30E+08
19	9	P	104564.92	956.3437	0.11E-02	0.92E+07
19	9	R	106544.00	938.5794	0.41E-02	0.28E+08
19	10	P	103641.25	964.8668	0.15E-02	0.12E+08
19	10	R	105771.31	945.4360	0.38E-02	0.26E+08
19	11	P	102667.51	974.0179	0.23E-02	0.18E+08
19	11	R	104935.31	952.9680	0.34E-02	0.23E+08
19	12	P	101658.71	983.6835	0.55E-02	0.41E+08
19	12	R	104050.50	961.0718	0.15E-02	0.10E+08
19	13	P	100552.36	994.5067	0.21E-04	0.15E+06
19	13	R	103054.69	970.3585	0.81E-02	0.53E+08
19	14	P	99467.35	1005.3550	0.58E-03	0.41E+07
19	14	R	102067.19	979.7468	0.63E-02	0.41E+08
20	0	P	110396.60	905.8250	0.11E-02	0.26E+08
20	1	P	110179.01	907.6139	0.12E-02	0.16E+08
20	1	R	110533.36	904.7042	0.38E-02	0.10E+08
20	2	P	109864.40	910.2129	0.12E-02	0.13E+08
20	2	R	110451.44	905.3752	0.27E-02	0.13E+08
20	3	P	109456.07	913.6086	0.12E-02	0.12E+08
20	3	R	110270.50	906.8609	0.25E-02	0.15E+08
20	4	P	108957.77	917.7868	0.12E-02	0.11E+08
20	4	R	109992.44	909.1534	0.25E-02	0.16E+08
20	5	P	108374.34	922.7276	0.13E-02	0.12E+08
20	5	R	109620.32	912.2396	0.24E-02	0.16E+08
20	6	P	107710.42	928.4153	0.14E-02	0.13E+08
20	6	R	109157.78	916.1051	0.23E-02	0.16E+08
20	7	P	106973.02	934.8152	0.18E-02	0.15E+08
20	7	R	108609.99	920.7257	0.21E-02	0.14E+08
20	8	P	106169.69	941.8884	0.27E-02	0.23E+08
20	8	R	107984.09	926.0623	0.15E-02	0.10E+08
20	9	P	105334.02	949.3609	0.72E-02	0.59E+08
20	9	R	107313.10	931.8527	0.57E-06	0.39E+04
20	10	P	104331.83	958.4803	0.50E-04	0.39E+06
20	10	R	106461.89	939.3033	0.53E-02	0.37E+08
20	11	P	103357.02	967.5202	0.51E-03	0.40E+07
20	11	R	105624.82	946.7472	0.44E-02	0.30E+08
20	12	P	102330.70	977.2239	0.94E-03	0.71E+07
20	12	R	104722.49	954.9047	0.40E-02	0.27E+08
20	13	P	101263.50	987.5226	0.15E-02	0.11E+08
20	13	R	103765.83	963.7084	0.36E-02	0.24E+08
20	14	P	100166.17	998.3411	0.34E-02	0.24E+08
20	14	R	102766.01	973.0844	0.24E-02	0.16E+08
21	0	P	111114.67	899.9712	0.87E-03	0.21E+08
21	1	P	110897.40	901.7344	0.11E-02	0.16E+08
21	1	R	111251.75	898.8623	0.22E-02	0.61E+07
21	2	P	110583.78	904.2918	0.14E-02	0.16E+08
21	2	R	111170.82	899.5166	0.12E-02	0.60E+07
21	3	P	110179.34	907.6112	0.21E-02	0.22E+08
21	3	R	110993.77	900.9515	0.54E-03	0.32E+07
21	4	P	109705.00	911.5354	0.43E-02	0.42E+08
21	4	R	110739.67	903.0187	0.19E-03	0.12E+07
21	5	P	109066.89	916.8685	0.63E-04	0.59E+06
21	5	R	110312.87	906.5125	0.41E-02	0.27E+08
21	6	P	108404.45	922.4714	0.35E-03	0.31E+07
21	6	R	109851.81	910.3173	0.32E-02	0.22E+08
21	7	P	107663.08	928.8235	0.56E-03	0.49E+07
21	7	R	109300.05	914.9127	0.29E-02	0.20E+08
21	8	P	106850.11	935.8904	0.75E-03	0.64E+07
21	8	R	108664.51	920.2636	0.27E-02	0.19E+08
21	9	P	105973.17	943.6350	0.99E-03	0.82E+07
21	9	R	107952.25	926.3354	0.25E-02	0.17E+08
21	10	P	105038.77	952.0294	0.14E-02	0.11E+08
21	10	R	107166.83	933.1072	0.22E-02	0.16E+08
21	11	P	104057.74	961.0050	0.27E-02	0.21E+08
21	11	R	106325.54	940.5078	0.14E-02	0.99E+07
21	12	P	102962.22	971.2301	0.97E-03	0.74E+07
21	12	R	105354.01	949.1808	0.66E-02	0.45E+08
21	13	P	101914.86	981.2112	0.17E-03	0.12E+07
21	13	R	104417.19	957.6967	0.46E-02	0.31E+08
21	14	P	100807.30	991.9916	0.63E-03	0.45E+07
21	14	R	103407.14	967.0512	0.40E-02	0.27E+08
22	0	P	111808.46	894.3867	0.71E-03	0.18E+08
22	1	P	111589.75	896.1396	0.80E-03	0.11E+08
22	1	R	111944.10	893.3030	0.24E-02	0.68E+07
22	2	P	111272.86	898.6918	0.82E-03	0.94E+07
22	2	R	111859.90	893.9754	0.17E-02	0.86E+07
22	3	P	110861.06	902.0300	0.83E-03	0.88E+07
22	3	R	111675.49	895.4517	0.16E-02	0.95E+07
22	4	P	110358.13	906.1407	0.88E-03	0.87E+07
22	4	R	111392.80	897.7241	0.15E-02	0.99E+07
22	5	P	109769.06	911.0035	0.97E-03	0.92E+07
22	5	R	111015.04	900.7788	0.15E-02	0.99E+07
22	6	P	109098.84	916.6000	0.12E-02	0.11E+08
22	6	R	110546.20	904.5991	0.13E-02	0.92E+07
22	7	P	108355.95	922.8842	0.17E-02	0.15E+08
22	7	R	109992.92	909.1494	0.99E-03	0.69E+07
22	8	P	107559.68	929.7164	0.37E-02	0.32E+08
22	8	R	109374.08	914.2934	0.85E-04	0.60E+06
22	9	P	106615.78	937.9474	0.15E-05	0.13E+05
22	9	R	108594.86	920.8539	0.39E-02	0.28E+08
22	10	P	105684.96	946.2084	0.25E-03	0.20E+07
22	10	R	107815.02	927.5145	0.30E-02	0.21E+08
22	11	P	104692.91	955.1745	0.54E-03	0.43E+07
22	11	R	106960.71	934.9227	0.27E-02	0.19E+08
22	12	P	103652.52	964.7619	0.89E-03	0.69E+07
22	12	R	106044.31	943.0020	0.25E-02	0.17E+08
22	13	P	102573.14	974.9141	0.17E-02	0.13E+08
22	13	R	105075.47	951.6969	0.20E-02	0.13E+08
22	14	P	101491.27	985.3065	0.73E-02	0.54E+08
22	14	R	104091.11	960.6969	0.11E-04	0.71E+05
23	0	P	112477.51	889.0666	0.58E-03	0.15E+08
23	1	P	112260.27	890.7871	0.95E-03	0.13E+08
23	1	R	112614.62	887.9842	0.77E-03	0.22E+07
23	2	P	111951.13	893.2469	0.18E-02	0.21E+08
23	2	R	112538.17	888.5874	0.28E-05	0.14E+05
23	3	P	111509.63	896.7835	0.16E-07	0.17E+03
23	3	R	112324.06	890.2812	0.38E-02	0.23E+08
23	4	P	111010.54	900.8154	0.15E-03	0.15E+07
23	4	R	112045.21	892.4969	0.24E-02	0.16E+08

TABLE IV *(continued)*.

v'	J'		σ	λ	f	A
23	5	P	110419.83	905.6344	0.29E-03	0.28E+07
23	5	R	111665.81	895.5292	0.20E-02	0.14E+08
23	6	P	109745.29	911.2008	0.40E-03	0.37E+07
23	6	R	111192.65	899.3400	0.18E-02	0.13E+08
23	7	P	108994.06	917.4812	0.50E-03	0.45E+07
23	7	R	110631.03	903.9055	0.17E-02	0.12E+08
23	8	P	108171.19	924.4606	0.64E-03	0.56E+07
23	8	R	109985.59	909.2100	0.16E-02	0.12E+08
23	9	P	107284.15	932.1041	0.87E-03	0.74E+07
23	9	R	109263.23	915.2210	0.15E-02	0.11E+08
23	10	P	106340.94	940.3716	0.14E-02	0.12E+08
23	10	R	108471.00	921.9054	0.11E-02	0.80E+07
23	11	P	105369.98	949.0369	0.42E-02	0.34E+08
23	11	R	107637.78	929.0418	0.41E-04	0.29E+06
23	12	P	104256.71	959.1709	0.50E-05	0.39E+05
23	12	R	106648.50	937.6597	0.34E-02	0.24E+08
23	13	P	103174.11	969.2354	0.28E-03	0.22E+07
23	13	R	105676.44	946.2847	0.28E-02	0.19E+08
23	14	P	102049.44	979.9171	0.63E-03	0.47E+07
23	14	R	104649.28	955.5727	0.25E-02	0.17E+08
24	0	P	113121.53	884.0050	0.48E-03	0.12E+08
24	1	P	112901.67	885.7265	0.55E-03	0.78E+07
24	1	R	113256.02	882.9553	0.16E-02	0.45E+07
24	2	P	112582.47	888.2377	0.57E-03	0.66E+07
24	2	R	113169.51	883.6302	0.11E-02	0.56E+07
24	3	P	112167.21	891.5261	0.60E-03	0.65E+07
24	3	R	112981.64	885.0995	0.10E-02	0.61E+07
24	4	P	111659.75	895.5779	0.66E-03	0.67E+07
24	4	R	112694.42	887.3554	0.94E-03	0.62E+07
24	5	P	111065.30	900.3712	0.76E-03	0.74E+07
24	5	R	112311.28	890.3825	0.85E-03	0.59E+07
24	6	P	110389.78	905.6810	0.10E-02	0.96E+07
24	6	R	111837.14	894.1573	0.66E-03	0.47E+07
24	7	P	109647.70	912.0118	0.19E-02	0.18E+08
24	7	R	111284.67	898.5963	0.17E-03	0.12E+07
24	8	P	108762.65	919.4333	0.68E-04	0.60E+06
24	8	R	110577.05	904.3468	0.29E-02	0.21E+08
24	9	P	107885.42	926.9093	0.11E-03	0.91E+06
24	9	R	109864.50	910.2121	0.21E-02	0.15E+08
24	10	P	106935.55	935.1427	0.30E-03	0.25E+07
24	10	R	109065.61	916.8793	0.18E-02	0.13E+08
24	11	P	105929.65	944.0228	0.51E-03	0.41E+07
24	11	R	108197.45	924.2362	0.17E-02	0.12E+08
24	12	P	104876.55	953.5020	0.87E-03	0.69E+07
24	12	R	107268.34	932.2415	0.14E-02	0.10E+08
24	13	P	103791.38	963.4712	0.23E-02	0.18E+08
24	13	R	106293.71	940.7894	0.61E-03	0.42E+07
24	14	P	102611.29	974.5516	0.58E-04	0.44E+06
24	14	R	105211.13	950.4698	0.36E-02	0.25E+08
25	0	P	113740.49	879.1944	0.39E-03	0.10E+08
25	1	P	113516.55	880.9288	0.16E-03	0.23E+07
25	1	R	113870.90	878.1875	0.33E-02	0.94E+07
25	2	P	113194.61	883.4343	0.17E-03	0.21E+07
25	2	R	113781.65	878.8763	0.18E-02	0.93E+07
25	3	P	112776.78	886.7074	0.21E-03	0.23E+07
25	3	R	113591.21	880.3498	0.14E-02	0.88E+07
25	4	P	112266.15	890.7404	0.25E-03	0.26E+07
25	4	R	113300.82	882.6061	0.13E-02	0.85E+07
25	5	P	111667.30	895.5173	0.29E-03	0.29E+07
25	5	R	112913.28	885.6354	0.12E-02	0.82E+07
25	6	P	110984.65	901.0255	0.35E-03	0.33E+07
25	6	R	112432.01	889.4264	0.11E-02	0.80E+07
25	7	P	110224.71	907.2376	0.42E-03	0.38E+07
25	7	R	111861.68	893.9612	0.11E-02	0.77E+07
25	8	P	109392.54	914.1391	0.54E-03	0.48E+07
25	8	R	111206.94	899.2245	0.99E-03	0.72E+07
25	9	P	108496.32	921.6902	0.79E-03	0.69E+07
25	9	R	110475.40	905.1789	0.82E-03	0.60E+07
25	10	P	107549.62	929.8034	0.17E-02	0.14E+08
25	10	R	109679.68	911.7460	0.32E-03	0.23E+07
25	11	P	106479.46	939.1483	0.11E-03	0.91E+06
25	11	R	108747.26	919.5634	0.27E-02	0.20E+08
25	12	P	105434.18	948.4590	0.96E-04	0.77E+06
25	12	R	107825.97	927.4203	0.20E-02	0.14E+08
25	13	P	104332.71	958.4722	0.31E-03	0.24E+07
25	13	R	106835.04	936.0225	0.18E-02	0.12E+08
25	14	P	103192.65	969.0613	0.64E-03	0.48E+07
25	14	R	105792.49	945.2467	0.15E-02	0.11E+08
26	0	P	114334.10	874.6297	0.32E-03	0.84E+07
26	1	P	114113.08	876.3237	0.38E-03	0.55E+07
26	1	R	114467.43	873.6109	0.10E-02	0.30E+07
26	2	P	113791.57	878.7997	0.41E-03	0.49E+07
26	2	R	114378.61	874.2893	0.70E-03	0.36E+07
26	3	P	113372.89	882.0451	0.44E-03	0.46E+07
26	3	R	114187.32	875.7540	0.62E-03	0.39E+07
26	4	P	112861.02	886.0455	0.50E-03	0.52E+07
26	4	R	113895.69	877.9964	0.56E-03	0.38E+07
26	5	P	112261.70	890.7758	0.63E-03	0.63E+07
26	5	R	113507.68	880.9977	0.46E-03	0.32E+07
26	6	P	111583.61	896.1890	0.10E-02	0.98E+07
26	6	R	113030.97	884.7133	0.20E-03	0.15E+07
26	7	P	110759.76	902.8550	0.23E-03	0.21E+07
26	7	R	112396.73	889.7056	0.22E-02	0.16E+08
26	8	P	109947.28	909.5268	0.30E-04	0.27E+06
26	8	R	111761.68	894.7611	0.15E-02	0.11E+08
26	9	P	109048.23	917.0254	0.16E-03	0.14E+07
26	9	R	111027.31	900.6793	0.13E-02	0.94E+07
26	10	P	108064.64	925.2008	0.29E-03	0.24E+07
26	10	R	110214.70	907.3199	0.11E-02	0.84E+07
26	11	P	107065.91	934.0041	0.47E-03	0.39E+07
26	11	R	109333.71	914.6310	0.10E-02	0.74E+07
26	12	P	106001.66	943.3815	0.92E-03	0.75E+07
26	12	R	108393.45	922.5650	0.72E-03	0.52E+07
26	13	P	104821.35	954.0041	0.11E-02	0.84E+07
26	13	R	107323.69	931.7606	0.29E-02	0.21E+08
26	14	P	103709.19	964.2347	0.24E-04	0.19E+06
26	14	R	106309.03	940.6539	0.20E-02	0.14E+08
27	0	P	114902.50	870.3031	0.27E-03	0.70E+07
27	1	P	114679.72	871.9938	0.23E-03	0.34E+07
27	1	R	115034.07	869.3077	0.13E-02	0.37E+07
27	2	P	114355.50	874.4660	0.21E-03	0.26E+07
27	2	R	114942.54	869.9999	0.90E-03	0.47E+07
27	3	P	113933.53	877.7048	0.21E-03	0.23E+07
27	3	R	114747.96	871.4752	0.81E-03	0.51E+07
27	4	P	113417.53	881.6979	0.22E-03	0.23E+07
27	4	R	114452.20	873.7272	0.77E-03	0.52E+07
27	5	P	112812.21	886.4289	0.24E-03	0.24E+07
27	5	R	114058.19	876.7455	0.74E-03	0.52E+07
27	6	P	112122.02	891.8654	0.27E-03	0.27E+07
27	6	R	113569.38	880.5190	0.71E-03	0.51E+07
27	7	P	111353.57	898.0404	0.33E-03	0.31E+07
27	7	R	112990.54	885.0298	0.66E-03	0.49E+07
27	8	P	110512.19	904.8776	0.45E-03	0.41E+07
27	8	R	112326.59	890.2612	0.59E-03	0.44E+07
27	9	P	109607.65	912.3451	0.75E-03	0.67E+07
27	9	R	111586.73	896.1639	0.39E-03	0.29E+07
27	10	P	108669.83	920.2186	0.21E-02	0.18E+08
27	10	R	110799.89	902.5280	0.21E-05	0.15E+05
27	11	P	107574.05	929.5922	0.54E-05	0.46E+05
27	11	R	109841.85	910.3998	0.15E-02	0.11E+08
27	12	P	106503.68	938.9347	0.13E-03	0.11E+07
27	12	R	108895.47	918.3118	0.12E-02	0.90E+07
27	13	P	105385.01	948.9016	0.31E-03	0.24E+07
27	13	R	107887.34	926.8928	0.11E-02	0.78E+07
27	14	P	104229.41	959.4221	0.68E-03	0.53E+07
27	14	R	106829.25	936.0732	0.82E-03	0.58E+07
28	0	P	115443.89	866.2217	0.22E-03	0.58E+07
28	1	P	115221.63	867.8926	0.26E-03	0.39E+07
28	1	R	115575.98	865.2317	0.67E-03	0.20E+07
28	2	P	114897.63	870.3400	0.29E-03	0.35E+07
28	2	R	115484.67	865.9158	0.45E-03	0.24E+07
28	3	P	114475.27	873.5511	0.32E-03	0.36E+07
28	3	R	115289.70	867.3802	0.39E-03	0.25E+07
28	4	P	113956.73	877.5107	0.38E-03	0.40E+07
28	4	R	114993.40	869.6151	0.33E-03	0.23E+07
28	5	P	113354.66	882.1869	0.54E-03	0.54E+07
28	5	R	114600.64	872.5955	0.21E-03	0.15E+07
28	6	P	112676.77	887.4786	0.11E-02	0.10E+08
28	6	R	114126.13	876.2235	0.19E-05	0.14E+05
28	7	P	111855.16	894.0133	0.71E-07	0.67E+03
28	7	R	113492.13	881.1183	0.12E-02	0.89E+07

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
28	8	P	111015.62	900.7742	0.69E-04	0.63E+06
28	8	R	112830.02	886.2890	0.91E-03	0.68E+07
28	9	P	110102.04	908.2483	0.15E-03	0.14E+07
28	9	R	112081.12	892.2109	0.80E-03	0.60E+07
28	10	P	109124.86	916.3815	0.25E-03	0.21E+07
28	10	R	111254.92	898.8366	0.72E-03	0.53E+07
28	11	P	108092.45	925.1340	0.42E-03	0.35E+07
28	11	R	110360.25	906.1233	0.59E-03	0.44E+07
28	12	P	107018.63	934.4167	0.11E-02	0.87E+07
28	12	R	109410.42	913.9897	0.24E-03	0.17E+07
28	13	P	105842.87	944.7968	0.53E-04	0.43E+06
28	13	R	108345.20	922.9758	0.17E-02	0.12E+08
28	14	P	104686.22	955.2356	0.71E-04	0.56E+06
28	14	R	107286.06	932.0876	0.12E-02	0.88E+07
29	0	P	115956.67	862.3911	0.18E-03	0.48E+07
29	1	P	115732.90	864.0585	0.17E-03	0.26E+07
29	1	R	116087.25	861.4210	0.77E-03	0.23E+07
29	2	P	115406.27	866.5041	0.16E-03	0.20E+07
29	2	R	115993.31	862.1187	0.55E-03	0.30E+07
29	3	P	114980.30	869.7142	0.16E-03	0.18E+07
29	3	R	115794.73	863.5971	0.51E-03	0.33E+07
29	4	P	114456.81	873.6768	0.16E-03	0.17E+07
29	4	R	115493.46	865.8498	0.49E-03	0.34E+07
29	5	P	113846.57	878.3752	0.18E-03	0.18E+07
29	5	R	115092.55	868.8660	0.47E-03	0.34E+07
29	6	P	113148.12	883.7973	0.21E-03	0.20E+07
29	6	R	114595.48	872.6348	0.45E-03	0.33E+07
29	7	P	112370.14	889.9161	0.26E-03	0.24E+07
29	7	R	114007.11	877.1382	0.42E-03	0.31E+07
29	8	P	111518.36	896.7133	0.36E-03	0.34E+07
29	8	R	113332.76	882.3574	0.34E-03	0.26E+07
29	9	P	110605.29	904.1159	0.71E-03	0.64E+07
29	9	R	112564.37	888.2228	0.14E-03	0.11E+07
29	10	P	109567.90	912.6760	0.82E-04	0.72E+06
29	10	R	111697.96	895.2715	0.13E-02	0.94E+07
29	11	P	108542.24	921.3003	0.33E-04	0.29E+06
29	11	R	110810.04	902.4453	0.91E-03	0.68E+07
29	12	P	107451.48	930.6526	0.13E-03	0.11E+07
29	12	R	109843.27	910.3881	0.77E-03	0.57E+07
29	13	P	106313.64	940.6131	0.28E-03	0.23E+07
29	13	R	108815.97	918.9827	0.65E-03	0.47E+07
29	14	P	105141.44	951.0998	0.81E-03	0.64E+07
29	14	R	107741.28	928.1494	0.32E-03	0.23E+07
30	0	P	116438.45	858.8228	0.15E-03	0.40E+07
30	1	P	116214.73	860.4761	0.18E-03	0.27E+07
30	1	R	116569.08	857.8604	0.45E-03	0.13E+07
30	2	P	115887.82	862.9035	0.20E-03	0.25E+07
30	2	R	116474.86	858.5544	0.29E-03	0.16E+07
30	3	P	115461.11	866.0925	0.23E-03	0.26E+07
30	3	R	116275.54	860.0261	0.25E-03	0.16E+07
30	4	P	114938.93	870.0272	0.28E-03	0.30E+07
30	4	R	115973.60	862.2652	0.19E-03	0.14E+07
30	5	P	114328.93	874.6693	0.44E-03	0.45E+07
30	5	R	115574.91	865.2397	0.86E-04	0.63E+06
30	6	P	113578.32	880.4497	0.10E-03	0.10E+07
30	6	R	115025.65	869.3711	0.10E-02	0.76E+07
30	7	P	112814.77	886.4088	0.11E-04	0.11E+06
30	7	R	114451.74	873.7307	0.70E-03	0.53E+07
30	8	P	111958.74	893.1862	0.67E-04	0.63E+06
30	8	R	113773.14	878.9421	0.57E-03	0.43E+07
30	9	P	111030.15	900.6563	0.12E-03	0.11E+07
30	9	R	113009.23	884.8835	0.50E-03	0.38E+07
30	10	P	110036.96	908.7855	0.20E-03	0.17E+07
30	10	R	112167.02	891.5276	0.44E-03	0.33E+07
30	11	P	108987.76	917.5342	0.36E-03	0.31E+07
30	11	R	111255.56	898.8315	0.32E-03	0.24E+07
30	12	P	107906.35	926.7295	0.12E-02	0.10E+08
30	12	R	110298.14	906.6336	0.64E-05	0.48E+05
30	13	P	106705.00	937.1632	0.20E-05	0.16E+05
30	13	R	109207.33	915.6894	0.91E-03	0.67E+07
30	14	P	105516.38	947.7202	0.91E-04	0.73E+06
30	14	R	108116.22	924.9306	0.72E-03	0.53E+07
31	0	P	116885.28	855.5397	0.12E-03	0.33E+07
31	1	P	116659.99	857.1919	0.12E-03	0.18E+07
31	1	R	117014.34	854.5961	0.50E-03	0.15E+07
31	2	P	116330.18	859.6222	0.11E-03	0.14E+07
31	2	R	116917.22	855.3060	0.36E-03	0.20E+07
31	3	P	115899.31	862.8179	0.11E-03	0.13E+07
31	3	R	116713.74	856.7971	0.33E-03	0.22E+07
31	4	P	115371.13	866.7679	0.11E-03	0.12E+07
31	4	R	116405.80	859.0637	0.32E-03	0.23E+07
31	5	P	114750.41	871.4566	0.12E-03	0.13E+07
31	5	R	115996.39	862.0958	0.31E-03	0.23E+07
31	6	P	114041.62	876.8729	0.14E-03	0.14E+07
31	6	R	115488.96	865.8835	0.29E-03	0.22E+07
31	7	P	113251.44	882.9910	0.18E-03	0.18E+07
31	7	R	114886.41	870.4099	0.26E-03	0.20E+07
31	8	P	112385.82	889.7920	0.27E-03	0.26E+07
31	8	R	114200.22	875.6551	0.19E-03	0.15E+07
31	9	P	111460.57	897.1783	0.62E-03	0.57E+07
31	9	R	113439.65	881.5260	0.26E-04	0.20E+06
31	10	P	110413.50	905.6863	0.22E-05	0.20E+05
31	10	R	112543.56	888.5448	0.71E-03	0.54E+07
31	11	P	109357.65	914.4308	0.45E-04	0.39E+06
31	11	R	111625.45	895.8531	0.53E-03	0.40E+07
31	12	P	108241.73	923.8581	0.12E-03	0.10E+07
31	12	R	110633.52	903.8852	0.44E-03	0.33E+07
31	13	P	107077.66	933.9016	0.27E-03	0.22E+07
31	13	R	109579.99	912.5753	0.32E-03	0.24E+07
31	14	P	105820.91	944.9928	0.55E-03	0.44E+07
31	14	R	108420.75	922.3326	0.11E-02	0.80E+07
32	0	P	117290.82	852.5817	0.97E-04	0.27E+07
32	1	P	117065.14	854.2253	0.12E-03	0.18E+07
32	1	R	117419.49	851.6474	0.29E-03	0.89E+06
32	2	P	116734.29	856.6463	0.13E-03	0.17E+07
32	2	R	117321.33	852.3599	0.19E-03	0.10E+07
32	3	P	116301.61	859.8333	0.15E-03	0.17E+07
32	3	R	117116.04	853.8540	0.16E-03	0.10E+07
32	4	P	115771.35	863.7715	0.19E-03	0.21E+07
32	4	R	116806.02	856.1202	0.12E-03	0.84E+06
32	5	P	115151.21	868.4234	0.30E-03	0.32E+07
32	5	R	116397.19	859.1273	0.41E-04	0.30E+06
32	6	P	114401.38	874.1153	0.29E-04	0.29E+06
32	6	R	115848.74	863.1945	0.62E-03	0.47E+07
32	7	P	113615.36	880.1627	0.15E-04	0.15E+06
32	7	R	115252.33	867.6614	0.42E-03	0.32E+07
32	8	P	112740.57	886.9921	0.52E-04	0.50E+06
32	8	R	114554.97	872.9433	0.34E-03	0.26E+07
32	9	P	111791.57	894.5216	0.90E-04	0.83E+06
32	9	R	113770.65	878.9613	0.29E-03	0.23E+07
32	10	P	110775.33	902.7281	0.15E-03	0.13E+07
32	10	R	112905.39	885.6973	0.24E-03	0.18E+07
32	11	P	109701.60	911.5636	0.34E-03	0.29E+07
32	11	R	111969.40	893.1012	0.11E-03	0.85E+06
32	12	P	108535.93	921.3539	0.31E-04	0.26E+06
32	12	R	110927.72	901.4879	0.63E-03	0.48E+07
32	13	P	107357.93	931.4636	0.31E-04	0.26E+06
32	13	R	109860.26	910.2473	0.41E-03	0.30E+07
32	14	P	105894.53	944.3359	0.13E-02	0.11E+08
32	14	R	108494.37	921.7066	0.56E-05	0.41E+05
33	0	P	117646.87	850.0013	0.75E-04	0.21E+07
33	1	P	117419.30	851.6487	0.73E-04	0.11E+07
33	1	R	117773.65	849.0863	0.32E-03	0.98E+06
33	2	P	117084.89	854.0812	0.68E-04	0.87E+06
33	2	R	117671.93	849.8203	0.23E-03	0.13E+07
33	3	P	116646.96	857.2677	0.67E-04	0.78E+06
33	3	R	117461.39	851.3436	0.21E-03	0.14E+07
33	4	P	116109.10	861.2589	0.69E-04	0.76E+06
33	4	R	117143.77	853.6519	0.19E-03	0.14E+07
33	5	P	115475.91	865.9815	0.76E-04	0.80E+06
33	5	R	116721.69	856.7374	0.18E-03	0.14E+07
33	6	P	114751.63	871.4473	0.90E-04	0.91E+06
33	6	R	116198.99	860.5927	0.17E-03	0.13E+07
33	7	P	113942.69	877.6342	0.12E-03	0.11E+07
33	7	R	115579.66	865.2041	0.14E-03	0.11E+07
33	8	P	113055.26	884.5232	0.20E-03	0.19E+07
33	8	R	114869.66	870.5519	0.77E-04	0.60E+06
33	9	P	112057.19	892.4015	0.77E-04	0.71E+06
33	9	R	114036.27	876.9140	0.49E-03	0.38E+07

TABLE IV (*continued*).

v'	J'		σ	λ	f	A
33	10	P	111037.47	900.5969	0.12E-04	0.11E+06
33	10	R	113167.53	883.6457	0.29E-03	0.23E+07
33	11	P	109938.85	909.5966	0.50E-04	0.44E+06
33	11	R	112206.65	891.2128	0.21E-03	0.16E+07
33	12	P	108778.35	919.3006	0.11E-03	0.94E+06
33	12	R	111170.14	899.5222	0.13E-03	0.98E+06
33	13	P	107539.39	929.8919	0.15E-03	0.12E+07
33	13	R	110041.72	908.7463	0.46E-03	0.35E+07
33	14	P	106123.87	942.2951	0.11E-03	0.86E+06
33	14	R	108723.71	919.7626	0.29E-03	0.21E+07
34	0	P	117936.19	847.9161	0.53E-04	0.15E+07
34	1	P	117707.36	849.5646	0.64E-04	0.98E+06
34	1	R	118061.71	847.0147	0.16E-03	0.49E+06
34	2	P	117370.11	852.0057	0.71E-04	0.92E+06
34	2	R	117957.15	847.7655	0.10E-03	0.56E+06
34	3	P	116927.64	855.2296	0.82E-04	0.96E+06
34	3	R	117742.07	849.3141	0.80E-04	0.53E+06
34	4	P	116384.01	859.2246	0.11E-03	0.12E+07
34	4	R	117418.68	851.6533	0.50E-04	0.36E+06
34	5	P	115748.81	863.9396	0.23E-03	0.24E+07
34	5	R	116994.79	854.7389	0.17E-06	0.13E+02
34	6	P	114993.71	869.6126	0.19E-05	0.20E+05
34	6	R	116441.07	858.8035	0.23E-03	0.18E+07
34	7	P	114172.04	875.8712	0.22E-04	0.22E+06
34	7	R	115809.01	863.4907	0.16E-03	0.12E+07
34	8	P	113263.70	882.8954	0.38E-04	0.36E+06
34	8	R	115078.10	868.9751	0.12E-03	0.91E+06
34	9	P	112275.95	890.6627	0.57E-04	0.53E+06
34	9	R	114255.03	875.2350	0.77E-04	0.60E+06
34	10	P	111215.78	899.1530	0.17E-03	0.15E+07
34	10	R	113345.84	882.2556	0.33E-05	0.25E+05
34	11	P	110069.85	908.5140	0.20E-05	0.17E+05
34	11	R	112337.65	890.1735	0.87E-04	0.67E+06
35	0	P	118135.16	846.4880	0.28E-04	0.80E+06
35	1	P	117903.56	848.1508	0.30E-04	0.46E+06
35	1	R	118257.91	845.6094	0.11E-03	0.33E+06
35	2	P	117560.71	850.6243	0.28E-04	0.37E+06
35	2	R	118147.75	846.3979	0.72E-04	0.40E+06
35	3	P	117109.51	853.9016	0.27E-04	0.32E+06
35	3	R	117923.94	848.0043	0.61E-04	0.40E+06
35	4	P	116553.10	857.9780	0.27E-04	0.30E+06
35	4	R	117587.77	850.4286	0.51E-04	0.37E+06
35	5	P	115895.57	862.8457	0.28E-04	0.30E+06
35	5	R	117141.55	853.6680	0.39E-04	0.29E+06
35	6	P	115140.81	868.5018	0.36E-04	0.37E+06
35	6	R	116588.17	857.7199	0.21E-04	0.16E+06
35	7	P	114283.29	875.0186	0.66E-04	0.65E+06
35	7	R	115920.26	862.6620	0.19E-03	0.15E+07
35	8	P	113356.42	882.1732	0.37E-05	0.36E+05
35	8	R	115170.82	868.2755	0.38E-04	0.30E+06
35	9	P	112341.70	890.1414	0.00E+00	0.00E+00
35	9	R	114320.78	874.7316	0.19E-04	0.15E+06
36	0	P	118217.98	845.8950	0.64E-05	0.23E+06
36	1	P	117983.65	847.5750	0.34E-05	0.53E+05
36	1	R	118338.00	845.0371	0.75E-04	0.23E+06
36	2	P	117635.98	850.0801	0.50E-05	0.65E+05
36	2	R	118223.02	845.8590	0.32E-04	0.18E+06
36	3	P	117177.78	853.4041	0.59E-05	0.70E+05
36	3	R	117992.21	847.5136	0.23E-04	0.15E+06
36	4	P	116612.64	857.5400	0.65E-05	0.72E+05
36	4	R	117647.31	849.9982	0.18E-04	0.13E+06
36	5	P	115945.25	862.4760	0.71E-05	0.75E+05
36	5	R	117191.23	853.3062	0.14E-04	0.10E+06
36	6	P	115180.00	868.2063	0.00E+00	0.00E+00
36	6	R	116627.36	857.4318	0.87E-05	0.67E+05
36	7	P	114303.12	874.8667	0.19E-03	0.19E+07
36	7	R	115940.09	862.5144	0.59E-04	0.46E+06
37	0	P	118245.49	845.6982	0.27E-05	0.75E+05
37	1	P	118011.56	847.3746	0.61E-05	0.94E+05
37	1	R	118365.91	844.8378	0.27E-05	0.85E+04
37	2	P	117661.69	849.8943	0.59E-07	0.76E+03
37	2	R	118248.73	845.6750	0.38E-04	0.21E+06
37	3	P	117201.40	853.2321	0.18E-05	0.21E+05
37	3	R	118015.83	847.3440	0.12E-04	0.77E+05
37	4	P	116633.52	857.3864	0.27E-05	0.30E+05
37	4	R	117668.19	849.8473	0.92E-05	0.66E+05

TABLE V. — *Transition wavenumbers* (σ *in* cm^{-1}), *wavelengths* (λ *in Å*), *oscillator strengths f and emission probabilities* (*A in* s^{-1}) *of* H_2 *Werner band system with the ground vibrational level* ($v'' = 0$) ; P : $\Delta J = J' - J'' = -1$; Q : $\Delta J = 0$; R : $\Delta J = 1$.

v'	J'		σ	λ	f	A
0	1	P	98797.79	1012.1684	0.55E-02	0.59E+08
0	1	Q	99032.42	1009.7703	0.24E-01	0.16E+09
0	1	R	99152.14	1008.5511	0.44E-01	0.96E+08
0	2	P	98570.40	1014.5033	0.82E-02	0.75E+08
0	2	Q	98918.09	1010.9375	0.24E-01	0.16E+09
0	2	R	99157.44	1008.4972	0.21E-01	0.81E+08
0	3	P	98291.35	1017.3835	0.99E-02	0.82E+08
0	3	Q	98747.98	1012.6789	0.24E-01	0.15E+09
0	3	R	99105.78	1009.0229	0.16E-01	0.74E+08
0	4	P	97962.72	1020.7965	0.11E-01	0.84E+08
0	4	Q	98524.00	1014.9811	0.24E-01	0.15E+09
0	4	R	98997.39	1010.1277	0.14E-01	0.71E+08
0	5	P	97586.84	1024.7263	0.10E-01	0.78E+08
0	5	Q	98248.20	1017.8303	0.24E-01	0.15E+09
0	5	R	98832.82	1011.8096	0.14E-01	0.75E+08
0	6	P	97148.93	1029.3474	0.49E-03	0.36E+07
0	6	Q	97923.48	1021.2056	0.24E-01	0.15E+09
0	6	R	98596.29	1014.2369	0.26E-01	0.14E+09
0	7	P	96716.86	1033.9459	0.17E-01	0.12E+09
0	7	Q	97552.20	1025.0922	0.24E-01	0.15E+09
0	7	R	98353.83	1016.7372	0.65E-02	0.36E+08
0	8	P	96219.86	1039.2865	0.16E-01	0.11E+09
0	8	Q	97136.52	1029.4577	0.24E-01	0.15E+09
0	8	R	98034.26	1020.0516	0.79E-02	0.45E+08
0	9	P	95690.03	1045.0410	0.15E-01	0.98E+08
0	9	Q	96684.74	1034.2894	0.24E-01	0.15E+09
0	9	R	97669.11	1023.8652	0.93E-02	0.53E+08
0	10	P	95156.54	1050.8999	0.26E-01	0.17E+09
0	10	Q	96195.21	1039.5528	0.24E-01	0.15E+09
0	10	R	97286.60	1027.8908	0.14E-03	0.79E+06
0	11	P	94552.80	1057.6101	0.19E-01	0.12E+09
0	11	Q	95672.90	1045.2280	0.24E-01	0.15E+09
0	11	R	96820.60	1032.8380	0.56E-02	0.32E+08
0	12	P	93943.28	1064.4721	0.17E-01	0.11E+09
0	12	Q	95121.54	1051.2866	0.24E-01	0.14E+09
0	12	R	96335.07	1038.0435	0.76E-02	0.43E+08
0	13	P	93326.57	1071.5062	0.24E-01	0.15E+09
0	13	Q	94544.53	1057.7027	0.24E-01	0.14E+09
0	13	R	95828.90	1043.5265	0.14E-02	0.81E+07
0	14	P	92676.55	1079.0216	0.19E-01	0.12E+09
0	14	Q	93945.27	1064.4496	0.24E-01	0.14E+09
0	14	R	95276.39	1049.5780	0.57E-02	0.32E+08
1	1	P	101103.66	989.0839	0.81E-02	0.92E+08
1	1	Q	101336.26	986.7939	0.36E-01	0.25E+09
1	1	R	101458.01	985.6294	0.69E-01	0.16E+09
1	2	P	100869.90	991.3760	0.12E-01	0.11E+09
1	2	Q	101217.66	987.9699	0.36E-01	0.25E+09
1	2	R	101456.94	985.6398	0.33E-01	0.14E+09
1	3	P	100580.92	994.2244	0.14E-01	0.12E+09
1	3	Q	101038.16	989.7251	0.37E-01	0.25E+09
1	3	R	101395.35	986.2385	0.26E-01	0.13E+09
1	4	P	100237.10	997.6346	0.13E-01	0.10E+09
1	4	Q	100801.74	992.0464	0.37E-01	0.25E+09
1	4	R	101271.77	987.4420	0.26E-01	0.14E+09
1	5	P	99879.23	1001.2092	0.27E-01	0.21E+09
1	5	Q	100510.52	994.9206	0.37E-01	0.25E+09
1	5	R	101125.21	988.8731	0.98E-03	0.55E+07
1	6	P	99423.52	1005.7983	0.24E-01	0.18E+09
1	6	Q	100167.48	998.3280	0.37E-01	0.25E+09
1	6	R	100870.88	991.3664	0.11E-01	0.63E+08
1	7	P	98941.30	1010.7003	0.23E-01	0.17E+09
1	7	Q	99775.08	1002.2542	0.37E-01	0.24E+09
1	7	R	100578.27	994.2505	0.13E-01	0.77E+08
1	8	P	98418.95	1016.0645	0.21E-01	0.15E+09
1	8	Q	99337.59	1006.6682	0.37E-01	0.24E+09
1	8	R	100233.35	997.6719	0.15E-01	0.89E+08
1	9	P	97842.90	1022.0465	0.85E-02	0.60E+08
1	9	Q	98857.42	1011.5578	0.37E-01	0.24E+09
1	9	R	99821.98	1001.7834	0.24E-01	0.14E+09
1	10	P	97289.66	1027.8585	0.28E-01	0.20E+09
1	10	Q	98339.04	1016.8901	0.37E-01	0.24E+09
1	10	R	99419.72	1005.8367	0.77E-02	0.46E+08
1	11	P	96667.70	1034.4717	0.25E-01	0.17E+09
1	11	Q	97785.54	1022.6461	0.37E-01	0.24E+09
1	11	R	98935.50	1010.7595	0.11E-01	0.67E+08
1	12	P	96000.91	1041.6568	0.87E-02	0.58E+08
1	12	Q	97200.77	1028.7984	0.37E-01	0.23E+09
1	12	R	98392.70	1016.3356	0.22E-01	0.13E+09
1	13	P	95371.69	1048.5292	0.29E-01	0.19E+09
1	13	Q	96586.25	1035.3227	0.37E-01	0.23E+09
1	13	R	97874.02	1021.7216	0.77E-02	0.45E+08
1	14	P	94682.71	1056.1591	0.24E-01	0.15E+09
1	14	Q	95951.49	1042.1933	0.37E-01	0.23E+09
1	14	R	97282.55	1027.9336	0.12E-01	0.73E+08
2	1	P	103275.04	968.2881	0.72E-02	0.85E+08
2	1	Q	103510.07	966.0895	0.35E-01	0.25E+09
2	1	R	103629.39	964.9772	0.69E-01	0.16E+09
2	2	P	103033.71	970.5562	0.97E-02	0.96E+08
2	2	Q	103383.29	967.2743	0.35E-01	0.25E+09
2	2	R	103620.75	965.0577	0.35E-01	0.15E+09
2	3	P	102728.13	973.4432	0.69E-02	0.62E+08
2	3	Q	103194.60	969.0429	0.35E-01	0.25E+09
2	3	R	103542.56	965.7865	0.32E-01	0.17E+09
2	4	P	102401.58	976.5475	0.22E-01	0.19E+09
2	4	Q	102946.00	971.3830	0.35E-01	0.25E+09
2	4	R	103436.25	966.7791	0.79E-02	0.44E+08
2	5	P	101989.25	980.4955	0.21E-01	0.17E+09
2	5	Q	102639.67	974.2822	0.35E-01	0.25E+09
2	5	R	103235.23	968.6616	0.13E-01	0.75E+08
2	6	P	101531.84	984.9127	0.20E-01	0.16E+09
2	6	Q	102276.67	977.7210	0.35E-01	0.25E+09
2	6	R	102979.20	971.0699	0.14E-01	0.84E+08
2	7	P	101026.03	989.8243	0.19E-01	0.15E+09
2	7	Q	101865.55	981.6862	0.35E-01	0.24E+09
2	7	R	102665.00	974.0418	0.16E-01	0.94E+08
2	8	P	100467.16	995.3501	0.11E-01	0.84E+08
2	8	Q	101404.66	986.1480	0.35E-01	0.24E+09
2	8	R	102281.56	977.6933	0.21E-01	0.13E+09
2	9	P	99925.65	1000.7440	0.26E-01	0.19E+09
2	9	Q	100896.52	991.0949	0.35E-01	0.24E+09
2	9	R	101904.73	981.3067	0.64E-02	0.39E+08
2	10	P	99299.09	1007.0586	0.24E-01	0.17E+09
2	10	Q	100351.71	996.4953	0.36E-01	0.24E+09
2	10	R	101429.15	985.9099	0.11E-01	0.66E+08
2	11	P	98635.90	1013.8297	0.16E-01	0.12E+09
2	11	Q	99767.44	1002.3310	0.36E-01	0.24E+09
2	11	R	100903.70	991.0440	0.16E-01	0.10E+09
2	12	P	97992.92	1020.4819	0.28E-01	0.19E+09
2	12	Q	99149.68	1008.5762	0.36E-01	0.23E+09
2	12	R	100384.71	996.1676	0.56E-02	0.35E+08
2	13	P	97282.24	1027.9366	0.24E-01	0.16E+09
2	13	Q	98502.05	1015.2073	0.36E-01	0.23E+09
2	13	R	99784.58	1002.1589	0.11E-01	0.65E+08
2	14	P	96594.24	1035.2564	0.29E-01	0.19E+09
2	14	Q	97828.21	1022.2000	0.36E-01	0.23E+09
2	14	R	99194.08	1008.1247	0.13E-02	0.80E+07
3	1	P	105306.57	949.6084	0.88E-03	0.11E+08
3	1	Q	105549.73	947.4208	0.27E-01	0.20E+09
3	1	R	105660.92	946.4237	0.62E-01	0.15E+09
3	2	P	105078.00	951.6740	0.13E-01	0.13E+09
3	2	Q	105416.89	948.6146	0.28E-01	0.20E+09
3	2	R	105665.04	946.3868	0.13E-01	0.59E+08
3	3	P	104769.62	954.4752	0.13E-01	0.13E+09
3	3	Q	105219.16	950.3972	0.28E-01	0.20E+09
3	3	R	105584.05	947.1128	0.14E-01	0.72E+08
3	4	P	104403.76	957.8199	0.14E-01	0.13E+09
3	4	Q	104958.58	952.7566	0.28E-01	0.20E+09
3	4	R	105438.43	948.4208	0.13E-01	0.75E+08
3	5	P	103982.25	961.7026	0.14E-01	0.12E+09
3	5	Q	104637.39	955.6813	0.28E-01	0.20E+09
3	5	R	105228.23	950.3154	0.13E-01	0.78E+08
3	6	P	103505.97	966.1279	0.14E-01	0.11E+09
3	6	Q	104258.73	959.1523	0.28E-01	0.20E+09
3	6	R	104953.33	952.8045	0.14E-01	0.84E+08
3	7	P	102968.63	971.1696	0.89E-02	0.71E+08
3	7	Q	103825.23	963.1570	0.28E-01	0.20E+09
3	7	R	104605.60	955.9718	0.17E-01	0.11E+09
3	8	P	102448.33	976.1018	0.20E-01	0.16E+09
3	8	Q	103341.34	967.6669	0.28E-01	0.20E+09
3	8	R	104262.73	959.1155	0.44E-02	0.28E+08
3	9	P	101827.22	982.0557	0.18E-01	0.14E+09
3	9	Q	102809.68	972.6711	0.28E-01	0.20E+09
3	9	R	103806.30	963.3327	0.84E-02	0.54E+08
3	10	P	101169.40	988.4412	0.15E-01	0.11E+09
3	10	Q	102234.92	978.1394	0.28E-01	0.20E+09
3	10	R	103299.46	968.0593	0.12E-01	0.76E+08
3	11	P	100534.06	994.6878	0.21E-01	0.16E+09
3	11	Q	101620.38	984.0545	0.28E-01	0.19E+09
3	11	R	102801.86	972.7450	0.24E-02	0.16E+08
3	12	P	99804.29	1001.9609	0.20E-01	0.14E+09
3	12	Q	100970.12	990.3920	0.28E-01	0.19E+09
3	12	R	102196.08	978.5111	0.75E-02	0.48E+08
3	13	P	99038.48	1009.7085	0.95E-02	0.67E+08
3	13	Q	100287.85	997.1297	0.28E-01	0.19E+09
3	13	R	101540.81	984.8257	0.13E-01	0.86E+08
3	14	P	98325.46	1017.0306	0.22E-01	0.15E+09
3	14	Q	99577.30	1004.2450	0.29E-01	0.19E+09
3	14	R	100925.30	990.8318	0.55E-02	0.35E+08

TABLE V (*continued*).

v'	J'		σ	λ	f	A
4	1	P	107226.32	932.6068	0.48E-02	0.61E+08
4	1	Q	107459.96	930.5792	0.19E-01	0.15E+09
4	1	R	107580.67	929.5350	0.34E-01	0.89E+08
4	2	P	106975.57	934.7929	0.71E-02	0.75E+08
4	2	Q	107321.16	931.7827	0.20E-01	0.15E+09
4	2	R	107562.61	929.6911	0.16E-01	0.73E+08
4	3	P	106660.49	937.5543	0.83E-02	0.81E+08
4	3	Q	107114.53	933.5802	0.20E-01	0.15E+09
4	3	R	107474.92	930.4496	0.12E-01	0.67E+08
4	4	P	106282.90	940.8851	0.89E-02	0.82E+08
4	4	Q	106842.13	935.9603	0.20E-01	0.15E+09
4	4	R	107317.57	931.8138	0.11E-01	0.65E+08
4	5	P	105844.46	944.7826	0.87E-02	0.77E+08
4	5	Q	106506.29	938.9117	0.20E-01	0.15E+09
4	5	R	107090.44	933.7902	0.11E-01	0.68E+08
4	6	P	105337.55	949.3291	0.55E-02	0.47E+08
4	6	Q	106110.18	942.4167	0.20E-01	0.15E+09
4	6	R	106784.91	936.4619	0.13E-01	0.81E+08
4	7	P	104845.70	953.7826	0.13E-01	0.11E+09
4	7	Q	105656.51	946.4632	0.20E-01	0.15E+09
4	7	R	106482.67	939.1199	0.32E-02	0.21E+08
4	8	P	104241.44	959.3114	0.13E-01	0.10E+09
4	8	Q	105149.81	951.0241	0.20E-01	0.15E+09
4	8	R	106055.84	942.8995	0.61E-02	0.41E+08
4	9	P	103597.01	965.2788	0.11E-01	0.84E+08
4	9	Q	104592.76	956.0891	0.20E-01	0.15E+09
4	9	R	105576.09	947.1841	0.82E-02	0.55E+08
4	10	P	102986.43	971.0018	0.13E-01	0.10E+09
4	10	Q	103990.13	961.6298	0.20E-01	0.15E+09
4	10	R	105116.49	951.3256	0.42E-03	0.28E+07
4	11	P	102239.00	978.1004	0.14E-01	0.11E+09
4	11	Q	103345.29	967.6300	0.20E-01	0.14E+09
4	11	R	104506.80	956.8756	0.48E-02	0.32E+08
4	12	P	101477.53	985.4398	0.10E-01	0.78E+08
4	12	Q	102662.35	974.0669	0.20E-01	0.14E+09
4	12	R	103869.32	962.7482	0.81E-02	0.53E+08
4	13	P	100747.62	992.5793	0.15E-01	0.11E+09
4	13	Q	101945.09	980.9203	0.21E-01	0.14E+09
4	13	R	103249.95	968.5235	0.26E-02	0.17E+08
4	14	P	99931.83	1000.6821	0.13E-01	0.94E+08
4	14	Q	101197.25	988.1692	0.21E-01	0.14E+09
4	14	R	102531.67	975.3084	0.62E-02	0.41E+08
5	1	P	109007.32	917.3696	0.29E-02	0.39E+08
5	1	Q	109241.73	915.4011	0.13E-01	0.10E+09
5	1	R	109361.67	914.3972	0.24E-01	0.65E+08
5	2	P	108749.53	919.5442	0.43E-02	0.48E+08
5	2	Q	109096.97	916.6158	0.13E-01	0.10E+09
5	2	R	109336.57	914.6071	0.12E-01	0.56E+08
5	3	P	108424.09	922.3043	0.50E-02	0.50E+08
5	3	Q	108881.40	918.4305	0.13E-01	0.10E+09
5	3	R	109238.52	915.4280	0.92E-02	0.52E+08
5	4	P	108031.39	925.6569	0.49E-02	0.47E+08
5	4	Q	108597.16	920.8344	0.13E-01	0.10E+09
5	4	R	109066.06	916.8755	0.87E-02	0.54E+08
5	5	P	107562.65	929.6907	0.27E-02	0.24E+08
5	5	Q	108246.57	923.8168	0.13E-01	0.10E+09
5	5	R	108808.63	919.0447	0.94E-02	0.61E+08
5	6	P	107103.86	933.6732	0.85E-02	0.75E+08
5	6	Q	107632.88	927.3609	0.13E-01	0.10E+09
5	6	R	108551.22	921.2241	0.26E-02	0.17E+08
5	7	P	106529.86	938.7040	0.81E-02	0.69E+08
5	7	Q	107358.84	931.4557	0.13E-01	0.10E+09
5	7	R	108166.83	924.4979	0.44E-02	0.30E+08
5	8	P	105907.27	944.2222	0.71E-02	0.59E+08
5	8	Q	106629.03	936.0751	0.13E-01	0.10E+09
5	8	R	107721.67	928.3183	0.57E-02	0.39E+08
5	9	P	105206.41	950.4943	0.26E-02	0.21E+08
5	9	Q	106246.20	941.2101	0.14E-01	0.10E+09
5	9	R	107187.49	932.9447	0.76E-02	0.52E+08
5	10	P	104574.28	956.2580	0.95E-02	0.76E+08
5	10	Q	105615.16	946.8338	0.14E-01	0.10E+09
5	10	R	106704.34	937.1690	0.28E-02	0.19E+08
5	11	P	103816.25	963.2404	0.80E-02	0.62E+08
5	11	Q	104939.36	952.9313	0.14E-01	0.10E+09
5	11	R	106064.05	942.6488	0.48E-02	0.33E+08
5	12	P	103096.10	969.9688	0.94E-02	0.72E+08
5	12	Q	104222.96	959.4815	0.14E-01	0.10E+09
5	12	R	105467.89	947.9761	0.44E-03	0.30E+07
5	13	P	102254.20	977.9549	0.96E-02	0.72E+08
5	13	Q	103469.82	966.4654	0.14E-01	0.10E+09
5	13	R	104756.53	954.5944	0.34E-02	0.23E+08
5	14	P	101375.82	986.4285	0.37E-02	0.27E+08
5	14	Q	102683.74	973.8640	0.14E-01	0.99E+08
5	14	R	103975.66	961.7636	0.64E-02	0.43E+08
6	1	P	110657.92	903.6858	0.18E-02	0.24E+08
6	1	Q	110893.01	901.7701	0.85E-02	0.70E+08
6	1	R	111012.27	900.8013	0.17E-01	0.45E+08
6	2	P	110392.50	905.8587	0.25E-02	0.28E+08
6	2	Q	110742.16	902.9985	0.86E-02	0.70E+08
6	2	R	110979.54	901.0670	0.83E-02	0.41E+08
6	3	P	110053.71	908.6472	0.24E-02	0.25E+08
6	3	Q	110517.50	904.8341	0.86E-02	0.70E+08
6	3	R	110868.14	901.9724	0.70E-02	0.41E+08
6	4	P	109626.45	912.1886	0.68E-03	0.66E+07
6	4	Q	110221.16	907.2667	0.86E-02	0.70E+08
6	4	R	110661.12	903.6597	0.66E-02	0.42E+08
6	5	P	109212.30	915.6478	0.51E-02	0.48E+08
6	5	Q	109855.57	910.2861	0.87E-02	0.70E+08
6	5	R	110458.26	905.3192	0.24E-02	0.16E+08
6	6	P	108678.37	920.1463	0.50E-02	0.45E+08
6	6	Q	109423.96	913.8766	0.87E-02	0.70E+08
6	6	R	110125.73	908.0530	0.32E-02	0.22E+08
6	7	P	108088.01	925.1720	0.45E-02	0.40E+08
6	7	Q	108929.17	918.0277	0.88E-02	0.70E+08
6	7	R	109724.98	911.3695	0.39E-02	0.27E+08
6	8	P	107426.46	930.8694	0.25E-02	0.21E+08
6	8	Q	108375.84	922.7149	0.89E-02	0.69E+08
6	8	R	109240.86	915.4084	0.50E-02	0.35E+08
6	9	P	106798.29	936.3446	0.61E-02	0.52E+08
6	9	Q	107766.76	927.9299	0.89E-02	0.69E+08
6	9	R	108777.37	919.3089	0.14E-02	0.10E+08
6	10	P	106046.86	942.9614	0.55E-02	0.45E+08
6	10	Q	107106.80	933.6475	0.90E-02	0.69E+08
6	10	R	108178.94	924.3944	0.29E-02	0.20E+08
6	11	P	105240.37	950.2057	0.26E-02	0.21E+08
6	11	Q	106399.45	939.8545	0.91E-02	0.69E+08
6	11	R	107508.17	930.1618	0.45E-02	0.32E+08
6	12	P	104489.21	957.0366	0.66E-02	0.52E+08
6	12	Q	105648.87	946.5316	0.92E-02	0.69E+08
6	12	R	106881.00	935.6200	0.17E-02	0.12E+08
6	13	P	103621.84	965.0475	0.49E-02	0.38E+08
6	13	Q	104858.89	953.6626	0.93E-02	0.68E+08
6	13	R	106124.17	942.2924	0.34E-02	0.24E+08
6	14	P	102787.26	972.8832	0.69E-02	0.52E+08
6	14	Q	104033.22	961.2314	0.94E-02	0.68E+08
6	14	R	105387.10	948.8828	0.11E-02	0.76E+07
7	1	P	112175.10	891.4634	0.95E-03	0.13E+08
7	1	Q	112411.72	889.5870	0.55E-02	0.47E+08
7	1	R	112529.45	888.6563	0.12E-01	0.33E+08
7	2	P	111896.06	893.6865	0.72E-03	0.84E+07
7	2	Q	112254.70	890.8313	0.55E-02	0.47E+08
7	2	R	112483.10	889.0224	0.63E-02	0.32E+08
7	3	P	111580.74	896.2120	0.29E-02	0.31E+08
7	3	Q	112020.80	892.6914	0.56E-02	0.47E+08
7	3	R	112395.17	889.7179	0.13E-02	0.80E+07
7	4	P	111160.17	899.6028	0.30E-02	0.30E+08
7	4	Q	111712.19	895.1574	0.56E-02	0.47E+08
7	4	R	112194.84	891.3066	0.22E-02	0.14E+08
7	5	P	110675.91	903.5390	0.30E-02	0.29E+08
7	5	Q	111331.28	898.2201	0.56E-02	0.46E+08
7	5	R	111921.89	893.4802	0.24E-02	0.17E+08
7	6	P	110125.89	908.0517	0.28E-02	0.26E+08
7	6	Q	110881.38	901.8646	0.57E-02	0.46E+08
7	6	R	111573.25	896.2722	0.27E-02	0.19E+08
7	7	P	109505.76	913.1940	0.19E-02	0.18E+08
7	7	Q	110365.33	906.0816	0.57E-02	0.46E+08
7	7	R	111142.73	899.7440	0.32E-02	0.23E+08
7	8	P	108898.75	918.2642	0.38E-02	0.34E+08
7	8	Q	109787.78	910.8481	0.58E-02	0.46E+08
7	8	R	110713.15	903.2351	0.61E-03	0.44E+07
7	9	P	108164.19	924.5204	0.37E-02	0.32E+08
7	9	Q	109151.54	916.1575	0.58E-02	0.46E+08
7	9	R	110143.27	907.9084	0.17E-02	0.12E+08
7	10	P	107383.25	931.2440	0.27E-02	0.23E+08
7	10	Q	108461.46	921.9865	0.59E-02	0.46E+08
7	10	R	109513.31	913.1310	0.26E-02	0.19E+08
7	11	P	106628.51	937.8355	0.42E-02	0.34E+08
7	11	Q	107720.99	928.3242	0.60E-02	0.46E+08
7	11	R	108896.31	918.3048	0.52E-03	0.38E+07
7	12	P	105756.44	945.5689	0.38E-02	0.31E+08
7	12	Q	106934.23	935.1542	0.61E-02	0.46E+08
7	12	R	108148.23	924.6569	0.17E-02	0.12E+08
7	13	P	104933.51	952.9844	0.36E-02	0.28E+08
7	13	Q	106104.93	942.4633	0.61E-02	0.46E+08
7	13	R	107435.84	930.7881	0.20E-04	0.14E+06
7	14	P	103970.48	961.8115	0.43E-02	0.33E+08
7	14	Q	105236.66	950.2392	0.62E-02	0.46E+08
7	14	R	106570.32	938.3476	0.14E-02	0.97E+07
8	1	P	113563.05	880.5681	0.11E-02	0.15E+08
8	1	Q	113794.45	878.7775	0.36E-02	0.31E+08
8	1	R	113917.40	877.8291	0.48E-02	0.14E+08
8	2	P	113287.44	882.7104	0.14E-02	0.17E+08
8	2	Q	113630.98	880.0417	0.36E-02	0.31E+08
8	2	R	113874.48	878.1599	0.24E-02	0.12E+08

TABLE V (*continued*).

v'	J'		σ	λ	f	A
8	3	P	112934.41	885.4697	0.16E-02	0.18E+08
8	3	Q	113387.42	881.9320	0.36E-02	0.31E+08
8	3	R	113748.84	879.1298	0.20E-02	0.12E+08
8	4	P	112506.60	888.8367	0.17E-02	0.18E+08
8	4	Q	113065.94	884.4396	0.36E-02	0.31E+08
8	4	R	113541.27	880.7370	0.19E-02	0.12E+08
8	5	P	112006.52	892.8052	0.17E-02	0.17E+08
8	5	Q	112668.95	887.5560	0.36E-02	0.31E+08
8	5	R	113252.50	882.9827	0.19E-02	0.13E+08
8	6	P	111432.74	897.4024	0.14E-02	0.13E+08
8	6	Q	112199.77	891.2675	0.37E-02	0.31E+08
8	6	R	112880.10	885.8958	0.21E-02	0.15E+08
8	7	P	110863.06	902.0137	0.22E-02	0.21E+08
8	7	Q	111661.21	895.5661	0.37E-02	0.31E+08
8	7	R	112500.03	888.8886	0.14E-03	0.10E+07
8	8	P	110147.12	907.8767	0.24E-02	0.22E+08
8	8	Q	111057.93	900.4310	0.38E-02	0.31E+08
8	8	R	111961.52	893.1640	0.94E-03	0.69E+07
8	9	P	109391.41	914.1485	0.21E-02	0.18E+08
8	9	Q	110392.69	905.8571	0.38E-02	0.31E+08
8	9	R	111370.49	897.9039	0.15E-02	0.11E+08
8	10	P	108558.29	921.1641	0.72E-03	0.62E+07
8	10	Q	109670.28	911.8241	0.38E-02	0.31E+08
8	10	R	110688.35	903.4374	0.20E-02	0.15E+08
8	11	P	107778.98	927.8247	0.27E-02	0.22E+08
8	11	Q	108894.04	918.3239	0.39E-02	0.31E+08
8	11	R	110046.78	908.7045	0.77E-03	0.57E+07
8	12	P	106871.27	935.7052	0.20E-02	0.16E+08
8	12	Q	108067.95	925.3438	0.39E-02	0.31E+08
8	12	R	109263.06	915.2224	0.15E-02	0.11E+08
8	13	P	105984.03	943.5383	0.28E-02	0.23E+08
8	13	Q	107195.48	932.8752	0.40E-02	0.31E+08
8	13	R	108486.37	921.7748	0.40E-03	0.29E+07
8	14	P	104994.87	952.4275	0.23E-02	0.18E+08
8	14	Q	106279.91	940.9116	0.40E-02	0.30E+08
8	14	R	107594.71	929.4137	0.13E-02	0.93E+07
9	1	P	114799.41	871.0846	0.57E-03	0.83E+07
9	1	Q	115033.43	869.3125	0.23E-02	0.20E+08
9	1	R	115153.76	868.4041	0.41E-02	0.12E+08
9	2	P	114516.29	873.2382	0.84E-03	0.10E+08
9	2	Q	114863.08	870.6018	0.23E-02	0.20E+08
9	2	R	115103.33	868.7846	0.19E-02	0.99E+07
9	3	P	114152.68	876.0197	0.98E-03	0.11E+08
9	3	Q	114609.19	872.5304	0.23E-02	0.20E+08
9	3	R	114967.11	869.8140	0.15E-02	0.92E+07
9	4	P	113710.44	879.4267	0.10E-02	0.11E+08
9	4	Q	114273.91	875.0904	0.23E-02	0.20E+08
9	4	R	114745.11	871.4968	0.14E-02	0.92E+07
9	5	P	113191.03	883.4622	0.95E-03	0.96E+07
9	5	Q	113859.64	878.2743	0.24E-02	0.20E+08
9	5	R	114437.01	873.8431	0.14E-02	0.10E+08
9	6	P	112585.98	888.2101	0.46E-03	0.45E+07
9	6	Q	113369.66	882.0702	0.24E-02	0.20E+08
9	6	R	114033.34	876.9365	0.16E-02	0.12E+08
9	7	P	111981.87	893.0017	0.16E-02	0.15E+08
9	7	Q	112806.73	886.4719	0.24E-02	0.20E+08
9	7	R	113618.84	880.1357	0.42E-03	0.31E+07
9	8	P	111253.26	898.8501	0.14E-02	0.13E+08
9	8	Q	112175.42	891.4609	0.24E-02	0.20E+08
9	8	R	113067.66	884.4262	0.80E-03	0.60E+07
9	9	P	110463.99	905.2724	0.11E-02	0.97E+07
9	9	Q	111478.39	897.0349	0.25E-02	0.20E+08
9	9	R	112443.07	889.3389	0.11E-02	0.87E+07
9	10	P	109680.69	911.7376	0.17E-02	0.15E+08
9	10	Q	110720.27	903.1770	0.25E-02	0.20E+08
9	10	R	111810.75	894.3684	0.16E-03	0.12E+07
9	11	P	108774.36	919.3343	0.16E-02	0.14E+08
9	11	Q	109904.19	909.8634	0.25E-02	0.20E+08
9	11	R	111042.16	900.5589	0.69E-03	0.52E+07
9	12	P	107812.60	927.5354	0.69E-03	0.58E+07
9	12	Q	109033.81	917.1467	0.25E-02	0.20E+08
9	12	R	110204.39	907.4048	0.12E-02	0.90E+07
9	13	P	106878.52	935.6417	0.17E-02	0.14E+08
9	13	Q	108112.11	924.9658	0.25E-02	0.20E+08
9	13	R	109380.85	914.2368	0.51E-03	0.38E+07
9	14	Q	107141.59	933.3443	0.25E-02	0.19E+08
10	1	P	115882.92	862.9400	0.35E-03	0.53E+07
10	1	Q	116117.50	861.1966	0.15E-02	0.14E+08
10	1	R	116237.27	860.3093	0.27E-02	0.82E+07
10	2	P	115591.56	865.1151	0.52E-03	0.65E+07
10	2	Q	115939.60	862.5181	0.15E-02	0.14E+08
10	2	R	116178.60	860.7437	0.13E-02	0.69E+07
10	3	P	115215.94	867.9355	0.60E-03	0.69E+07
10	3	Q	115674.35	864.4959	0.15E-02	0.14E+08
10	3	R	116030.37	861.8433	0.10E-02	0.65E+07
10	4	P	114757.67	871.4015	0.62E-03	0.67E+07
10	4	Q	115323.89	867.1230	0.15E-02	0.13E+08
10	4	R	115792.34	863.6150	0.94E-03	0.65E+07
10	5	P	114217.10	875.5257	0.52E-03	0.53E+07
10	5	Q	114890.55	870.3936	0.15E-02	0.13E+08
10	5	R	115463.08	866.0777	0.99E-03	0.72E+07
10	6	P	113654.07	879.8629	0.88E-03	0.87E+07
10	6	Q	114377.52	874.2977	0.15E-02	0.13E+08
10	6	R	115101.43	868.7989	0.42E-04	0.32E+06
10	7	P	112951.46	885.3361	0.98E-03	0.94E+07
10	7	Q	113787.45	878.8315	0.16E-02	0.13E+08
10	7	R	114588.43	872.6885	0.38E-03	0.29E+07
10	8	P	112194.57	891.3087	0.87E-03	0.82E+07
10	8	Q	113124.73	883.9800	0.16E-02	0.13E+08
10	8	R	114008.97	877.1240	0.59E-03	0.45E+07
10	9	P	111365.51	897.9440	0.50E-03	0.46E+07
10	9	Q	112391.73	889.7451	0.16E-02	0.13E+08
10	9	R	113344.59	882.2653	0.83E-03	0.64E+07
10	10	P	110531.83	904.7167	0.11E-02	0.96E+07
10	10	Q	111592.70	896.1160	0.16E-02	0.13E+08
10	10	R	112661.89	887.6116	0.23E-03	0.18E+07
10	11	P	109585.25	912.5316	0.85E-03	0.74E+07
10	11	Q	110730.14	903.0965	0.16E-02	0.13E+08
10	11	R	111853.05	894.0302	0.56E-03	0.43E+07
10	12	P	108623.51	920.6111	0.10E-02	0.88E+07
10	12	Q	109806.78	910.6906	0.16E-02	0.13E+08
10	12	R	111015.30	900.7768	0.17E-03	0.13E+07
11	1	P	116796.55	856.1897	0.22E-03	0.34E+07
11	1	Q	117031.40	854.4715	0.97E-03	0.88E+07
11	1	R	117150.90	853.5999	0.18E-02	0.54E+07
11	2	P	116496.26	858.3967	0.33E-03	0.42E+07
11	2	Q	116844.97	855.8349	0.97E-03	0.88E+07
11	2	R	117083.30	854.0928	0.83E-03	0.46E+07
11	3	P	116107.34	861.2720	0.38E-03	0.44E+07
11	3	Q	116566.85	857.8768	0.97E-03	0.88E+07
11	3	R	116921.77	855.2727	0.65E-03	0.43E+07
11	4	P	115631.38	864.8172	0.39E-03	0.42E+07
11	4	Q	116199.08	860.5920	0.97E-03	0.87E+07
11	4	R	116666.05	857.1474	0.61E-03	0.43E+07
11	5	P	115066.45	869.0480	0.30E-03	0.31E+07
11	5	Q	115743.84	863.9769	0.97E-03	0.87E+07
11	5	R	116314.43	859.7386	0.65E-03	0.48E+07
11	6	P	114465.11	873.6287	0.59E-03	0.59E+07
11	6	Q	115204.10	868.0247	0.97E-03	0.86E+07
11	6	R	115912.47	862.7200	0.63E-04	0.48E+06
11	7	P	113737.90	879.2144	0.59E-03	0.58E+07
11	7	Q	114582.19	872.7360	0.97E-03	0.86E+07
11	7	R	115374.87	866.7399	0.28E-03	0.21E+07
11	8	P	112943.84	885.3958	0.48E-03	0.46E+07
11	8	Q	113682.01	878.1018	0.96E-03	0.83E+07
11	8	R	114758.24	871.3971	0.41E-03	0.32E+07
11	9	P	112116.56	891.9289	0.55E-03	0.51E+07
11	9	Q	113105.20	884.1326	0.95E-03	0.81E+07
11	9	R	114095.64	876.4577	0.35E-04	0.28E+06
11	10	P	111167.16	899.5462	0.43E-03	0.39E+07
11	10	Q	112254.81	890.8304	0.91E-03	0.77E+07
11	10	R	113297.22	882.6342	0.32E-03	0.25E+07
12	1	P	117515.72	850.9500	0.14E-03	0.21E+07
12	1	Q	117750.78	849.2512	0.59E-03	0.55E+07
12	1	R	117870.07	848.3918	0.11E-02	0.33E+07
12	2	P	117204.77	853.2076	0.20E-03	0.26E+07
12	2	Q	117554.07	850.6724	0.59E-03	0.54E+07
12	2	R	117791.81	848.9555	0.50E-03	0.28E+07
12	3	P	116799.78	856.1660	0.23E-03	0.27E+07
12	3	Q	117260.34	852.8032	0.58E-03	0.54E+07
12	3	R	117614.21	850.2374	0.40E-03	0.26E+07
12	4	P	116302.07	859.8299	0.22E-03	0.24E+07
12	4	Q	116871.36	855.6416	0.58E-03	0.53E+07
12	4	R	117336.74	852.2480	0.37E-03	0.27E+07
12	5	P	115709.10	864.2363	0.11E-03	0.11E+07
12	5	Q	116388.90	859.1885	0.57E-03	0.51E+07
12	5	R	116955.08	855.0291	0.40E-03	0.30E+07
12	6	P	115054.54	869.1530	0.31E-03	0.32E+07
12	6	Q	115815.26	863.4440	0.55E-03	0.49E+07
12	6	R	116501.90	858.3551	0.16E-03	0.12E+07
12	7	Q	115151.70	868.4196	0.52E-03	0.46E+07
13	1	P	117995.68	847.4887	0.65E-04	0.10E+07
13	1	Q	118231.11	845.8011	0.28E-03	0.26E+07
13	1	R	118350.03	844.9512	0.50E-03	0.16E+07
13	2	P	117669.86	849.8353	0.82E-04	0.11E+07
13	2	Q	118020.21	847.3125	0.27E-03	0.25E+07
13	2	R	118256.90	845.6166	0.22E-03	0.12E+07