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ORBIT OF THE SPECTROSCOPIC BINARY 32 θ^2 CYGNI

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32 θ^2 Cygni ($\alpha=20^h 12^m$, $\delta=+47^\circ 24'$, mag. 5.15, type G5) was announced a binary in *L. O. B.* 4, p. 96, from four measures giving a range of 30 km. Later in *A. N.* 4750, Küstner published three measures of plates taken in 1908, 1909 and 1911, having a range of 40 km. The star was under observation here during the years 1914, 1915, 1916 and 1917, during which time 117 plates were taken.

The following determination of the elements must be considered as preliminary. The period being so long—1170 days—the measures were only beginning to repeat themselves at the end of the fourth year. More observations several years hence may change the period by some days but the other elements, as determined, are probably fairly accurate. Five plates taken in 1908 helped in the determination of the period.

The wave-lengths of the lines used are given in Table I. Table IV contains the observations,—number of the plate, date, phase, velocity, and residual.

TABLE I

4571.896	4395.461	4289.872
4549.646	4351.674	4282.858
4523.052	4340.705	4271.888
4501.865	4326.076	4215.906
4415.200	4304.891	4128.108
4404.042	4294.514	4101.653

TABLE II

LICK OBSERVATIONS OF 32 θ^2 CYGNI

Date	Julian Day	Velocity	Phase	Residual
1905, June 7.....	2,417,004	-25	983.61	+4.0
Aug. 13.....	071	-24	1050.61	-4.6
1906, July 22.....	414	+ 2	223.61	-2.2
Aug. 1.....	424	+ 5	233.61	+0.3

TABLE III
KÜSTNER'S OBSERVATIONS OF 32^o CYGNI

Date	Julian Day	Velocity	Phase	Residual
1908, Oct. 30-25.....	2,418,245.25	-18.4	1054.39	+ 0.6
1909, Oct. 2-33.....	582.33	+14.6	221.94	+10.4
1911, Aug. 31-39.....	2,419,280.39	-26.3	920.00	+ 9.3

TABLE IV
OTTAWA OBSERVATIONS OF 32^o CYGNI

Plate	Julian Day	Velocity	Phase	Residual
3714.....	2,418,952.600	-11.4	592.2	+ 6.1
3733.....	957.605	-12.6	597.2	+ 5.2
3745.....	962.586	-11.6	602.2	+ 5.8
3762.....	964.670	-14.7	604.3	+ 2.6
3767.....	965.590	-13.8	605.2	+ 3.4
6111.....	2,420,300.826	-34.0	770.4	- 9.0
6122.....	303.774	-22.7	773.4	+ 2.3
6128.....	306.817	-20.9	776.4	+ 4.6
6137.....	310.834	-29.3	780.4	- 3.1
6138.....	314.733	-28.4	784.3	- 1.4
6146.....	317.789	-31.4	787.4	- 4.4
6163.....	322.733	-23.9	792.3	+ 4.3
6168.....	323.649	-32.5	793.2	- 4.6
6176.....	327.790	-39.1	797.4	-11.1
6188.....	329.855	-41.6	799.5	-12.6
6197.....	331.753	-38.1	801.4	- 8.9
6215.....	335.722	-34.5	805.3	- 5.0
6222.....	338.731	-40.0	808.3	-10.0
6227.....	341.738	-25.2	811.3	+ 5.0
6243.....	348.674	-24.2	818.3	+ 6.0
6265.....	350.670	-22.4	820.3	+ 8.6
6275.....	359.727	-40.1	829.3	- 8.1
6300.....	369.633	-41.9	839.2	- 8.4
6306.....	370.593	-34.1	840.2	+ 0.8
6355.....	387.660	-41.5	857.3	- 6.5
6362.....	388.667	-34.5	858.3	+ 0.5
6368.....	390.596	-34.6	860.2	+ 0.6
6384.....	392.632	-29.5	862.2	+ 4.7
6415.....	397.632	-35.5	867.2	± 0.0
6425.....	401.592	-26.8	871.2	+ 8.9
6438.....	404.581	-34.6	874.2	+ 1.1
6453.....	407.551	-25.4	877.2	+10.5
6503.....	420.562	-34.3	890.2	+ 1.9
6511.....	427.539	-32.3	897.2	+ 4.1

TABLE IV
OTTAWA OBSERVATIONS OF 32 θ CYGNI—*Continued*

Plate	Julian Day	Velocity	Phase	Residual
6541.....	2,420,439.571	-34.0	909.2	+ 2.0
6568.....	460.529	-35.7	930.1	- 0.7
6579.....	464.535	-28.8	934.1	+ 0.9
6612.....	478.479	-38.4	948.1	- 4.9
6714.....	511.448	-34.3	981.0	- 4.8
6833.....	560.901	-30.9	1030.5	- 8.1
6929.....	602.856	-17.7	1072.5	- 0.9
6952.....	609.892	+ 0.5	1079.5	+16.5
6963.....	621.862	-20.6	1091.5	- 5.8
6972.....	624.835	-22.4	1094.4	- 7.9
6983.....	628.859	-10.8	1098.5	+ 3.2
7006.....	637.850	-10.2	1107.4	+ 3.3
7015.....	644.839	-11.5	1114.4	+ 1.3
7061.....	665.802	-12.1	1135.4	- 0.6
7084.....	680.690	- 1.8	1150.3	+ 8.9
7090.....	687.760	- 7.8	1157.4	+ 2.7
7102.....	693.760	-18.4	1163.4	- 8.2
7110.....	698.844	-12.1	1168.4	- 2.1
7129.....	707.763	-13.2	7.4	- 3.4
7149.....	720.737	- 5.4	20.3	+ 3.6
7165.....	733.765	- 3.6	33.4	+ 5.0
7187.....	742.632	- 8.1	42.4	+ 0.2
7216.....	749.705	+ 4.3	49.3	+12.5
7221.....	750.617	-11.2	50.2	- 3.1
7259.....	758.627	- 1.2	58.2	+ 6.6
7299.....	770.493	- 7.0	70.1	+ 0.5
7322.....	779.514	- 7.1	79.1	+ 0.2
7342.....	786.597	- 5.8	86.2	+ 1.2
7360.....	794.494	- 2.0	94.1	+ 4.5
7371.....	801.471	- 5.1	101.1	+ 1.2
7376.....	807.602	- 2.0	107.2	+ 3.8
7395.....	814.495	-10.5	114.1	- 5.2
7424.....	824.476	- 4.1	124.1	+ 0.4
7434.....	833.464	-10.1	133.1	- 6.1
7448.....	843.470	-10.0	143.1	- 7.0
7451.....	852.453	- 6.4	152.1	- 4.1
7455.....	860.437	+ 5.0	160.0	+ 6.3
7474.....	870.462	- 1.0	170.1	- 0.5
7488.....	880.474	- 4.6	180.1	- 5.1
7492.....	891.466	- 3.0	191.1	- 4.5
7555.....	940.913	+ 1.7	240.5	- 3.3
7620.....	973.865	- 4.0	273.4	-10.6
7630.....	986.774	+ 5.1	286.4	- 1.3
7663.....	2,421,003.688	+ 3.9	303.3	- 1.8
7679.....	015.692	+ 7.0	315.3	+ 2.0
7696.....	028.751	+ 9.1	328.4	+ 4.9
7701.....	036.755	+ 0.9	336.3	- 2.6
7712.....	044.837	- 0.4	344.4	- 2.9
7719.....	050.835	- 2.0	350.4	- 4.0
7730.....	058.686	- 5.3	358.3	- 6.3

TABLE IV

OTTAWA OBSERVATIONS OF 32 θ° CYGNI—*Concluded*

Plate	Julian Day	Velocity	Phase	Residual
7746.....	2,421,064.801	- 6.6	364.4	- 6.6
7763.....	076.778	+ 2.3	376.4	+ 3.8
7781.....	090.763	-10.5	390.3	- 7.0
7800.....	106.583	- 4.6	406.2	+ 1.1
7812.....	122.571	- 0.2	422.2	+ 8.3
7821.....	133.531	- 9.0	433.1	+ 1.0
7835.....	139.532	-11.1	439.1	- 0.6
7864.....	146.530	- 7.5	446.1	+ 4.0
7897.....	179.449	-11.8	479.0	+ 3.4
7903.....	188.510	-15.6	488.1	+ 0.6
7929.....	212.434	- 5.4	512.0	+12.6
8129.....	314.855	- 7.1	614.4	+ 9.1
8157.....	342.868	-17.7	642.5	- 1.9
8168.....	362.843	-17.3	662.4	- 1.5
8189.....	379.829	-21.9	679.4	- 5.4
8196.....	394.836	-19.4	694.4	- 2.1
8204.....	398.833	-16.8	698.8	+ 0.7
8212.....	407.827	-18.7	707.4	- 0.7
8215.....	414.831	-18.7	714.4	- 0.4
8224.....	425.709	-15.3	725.3	+ 4.0
8230.....	429.772	-11.7	729.4	+ 7.8
8242.....	435.777	-16.5	735.4	+ 3.8
8248.....	440.774	-20.2	740.4	+ 0.5
8261.....	447.774	-22.0	747.4	- 0.7
8270.....	460.660	-19.2	760.3	+ 4.0
8271.....	461.799	-32.8	761.4	- 9.3
8277.....	471.732	-22.8	771.3	+ 2.2
8284.....	478.677	-23.4	778.3	+ 2.8
8299.....	485.604	-21.4	785.2	+ 5.6
8302.....	495.611	-24.3	795.2	+ 3.7
8327.....	518.566	-43.3	818.2	-12.3
8353.....	546.534	-45.2	846.1	-11.2
8402.....	593.434	-37.1	893.0	- 5.7

MEASURES OF 32 ^o CYGNI

λ	3714		3733		3745		3762		3767		6111		6122	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	- 5.70	½	- 1.36	½	+ 4.57	½	- 2.71	½	+ 5.94	½	-37.37	½	-28.88	½
4549.646	- 1.72	½	.....	.....	.....	.....	+ 0.68	½	- 6.17	½	-56.30	½	-30.56	½
4523.052	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-37.15	½	-35.99	½
4501.865	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-40.77	½	-32.68	½
4415.200	+ 6.51	½	+ 0.42	½	- 7.85	½	.....	.....	.....	.....	-50.60	½	-33.10	½
4404.042	- 2.80	½	- 2.44	½	- 3.51	½	.....	.....	.....	.....	-48.90	½	-39.64	½
4395.461	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-48.96	½	.....	.....
4351.674	-15.25	½	- 3.43	½	.....	.....	- 7.75	½	- 9.40	½	-54.70	½	-33.15	½
4340.705	- 5.12	½	- 5.00	½	.....	.....	.....	.....	+ 3.48	½	-45.20	1	-35.43	½
4314.891	+ 4.50	½	- 0.14	½	+ 2.21	½	.....	.....	- 7.78	½	-33.32	½	-27.47	½
4294.514	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-40.44	½
4289.872	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-29.49	½	-32.22	½
4271.888	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-39.36	½	.....	.....
4215.906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-44.06	1	.....	.....
4128.108	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-41.18	½	.....	.....
Weighted mean	- 1.76		- 2.05		- 0.47		- 3.26		- 2.25		- 44.94		- 32.83	
V _a	- 9.34		- 10.12		- 10.76		- 11.02		- 11.15		+ 11.29		+ 11.09	
V _d	- 0.07		- 0.12		- 0.12		- 0.19		- 0.13		- 0.01		+ 0.04	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 11.4		- 12.6		- 11.6		- 14.7		- 13.8		- 34.0		- 22.7	

MEASURES OF 32 α CYGNI—*Continued*

λ	6128		6137		6138		6146		6163		6168		6176	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-33.26	$\frac{1}{2}$	-45.59	$\frac{1}{2}$	-31.80	$\frac{1}{2}$	-37.90	$\frac{1}{2}$	-33.65	$\frac{1}{2}$	-46.51	$\frac{1}{2}$	-44.92	$\frac{1}{2}$
4549.646	-38.92	$\frac{1}{4}$	-29.25	$\frac{1}{4}$	-36.31	$\frac{1}{2}$	-43.49	$\frac{1}{2}$	-43.09	$\frac{1}{2}$	-42.71	$\frac{1}{4}$	-52.64	$\frac{1}{2}$
4523.052	-46.00	$\frac{1}{4}$	-39.84	$\frac{1}{2}$	-29.83	$\frac{1}{2}$	-46.64	$\frac{1}{2}$	-40.87	$\frac{1}{2}$	-35.99	$\frac{1}{2}$	-43.43	$\frac{1}{2}$
4501.865	-30.53	$\frac{1}{2}$	-37.86	$\frac{1}{4}$	-42.28	$\frac{1}{4}$	-37.86	$\frac{1}{2}$	-36.60	$\frac{1}{2}$	-58.34	$\frac{1}{2}$	-40.77	$\frac{1}{2}$
4415.200	-35.84	$\frac{1}{4}$	-38.58	$\frac{1}{4}$	-44.65	$\frac{1}{2}$	.....	.....	-22.51	$\frac{1}{2}$	-29.06	$\frac{1}{2}$	-58.81	$\frac{1}{2}$
4395.461	.....	.....	-36.73	$\frac{1}{2}$	-36.85	$\frac{1}{2}$	-52.55	$\frac{1}{2}$	-38.72	$\frac{1}{2}$	-46.46	$\frac{1}{2}$	-41.71	$\frac{1}{2}$
4340.705	-26.68	$\frac{1}{2}$	-43.28	$\frac{1}{2}$	-32.70	1	-26.62	$\frac{1}{2}$	-12.77	$\frac{1}{2}$	-63.21	$\frac{1}{2}$	.....	.....
4326.076	-30.78	$\frac{1}{2}$	.....	.....	-36.00	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4314.891	-21.29	$\frac{1}{2}$	-36.86	$\frac{1}{2}$	-42.60	$\frac{1}{2}$	.....	.....	-35.75	$\frac{1}{2}$	-25.26	$\frac{1}{2}$	.....	.....
4294.514	.....	.....	-41.52	$\frac{1}{2}$	-53.59	$\frac{1}{2}$	.....	.....	-32.06	$\frac{1}{2}$	.....	.....	.....	.....
4289.872	-22.23	$\frac{1}{2}$	.....	.....	-39.02	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4282.858	.....	.....	-36.21	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	-41.30	$\frac{1}{2}$	-38.03	$\frac{1}{2}$	-33.64	$\frac{1}{2}$	.....	.....	-32.13	$\frac{1}{2}$	.....	.....	.....	.....
Weighted mean	- 31.30		- 39.23		- 37.79		- 40.42		- 32.33		- 40.76		- 46.59	
V_s	+ 10.76		+ 10.27		+ 9.75		+ 9.37		+ 8.57		+ 8.42		+ 7.74	
V_d	- 0.03		- 0.06		\pm 0.00		- 0.04		+ 0.05		+ 0.12		- 0.07	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 20.9		- 29.3		- 28.4		- 31.4		- 23.9		- 32.5		- 39.1	

MEASURES OF 32 θ° CYGNI—Continued

λ	6188		6197		6215		6222'		6227		6243		6265	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-50.76	$\frac{1}{2}$	-50.49	$\frac{1}{2}$	-40.55	$\frac{1}{2}$	-43.66	$\frac{1}{2}$	-37.37	$\frac{1}{2}$	-25.55	$\frac{1}{2}$	-29.15	$\frac{1}{2}$
4549.646	-48.20	$\frac{1}{2}$	-48.51	$\frac{1}{2}$	-39.84	$\frac{1}{2}$	-54.86	$\frac{1}{2}$	-24.15	$\frac{1}{2}$	-44.28	$\frac{1}{2}$	-18.80	$\frac{1}{2}$
4523.052	-49.85	$\frac{1}{2}$	-56.39	$\frac{1}{2}$	-36.89	$\frac{1}{2}$	-37.27	$\frac{1}{2}$	-33.66	$\frac{1}{2}$	-30.86	$\frac{1}{2}$	.....	.....
4501.865	-47.59	$\frac{1}{2}$	-40.39	$\frac{1}{2}$	-48.68	$\frac{1}{2}$	-48.60	$\frac{1}{2}$	-22.69	$\frac{1}{2}$	-40.64	$\frac{1}{2}$	-17.52	$\frac{1}{2}$
4415.200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-32.62	$\frac{1}{2}$	-22.88	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-26.30	$\frac{1}{2}$	.....	.....
4395.461	-48.95	$\frac{1}{2}$	-27.95	$\frac{1}{2}$	-37.67	$\frac{1}{2}$	.....	.....	-20.09	$\frac{1}{2}$	.....	.....	.....	.....
4351.674	.....	.....	.....	.....	.....	.....	-43.00	$\frac{1}{2}$	.....	.....	-46.40	$\frac{1}{2}$	-23.20	$\frac{1}{2}$
4340.705	-41.03	$\frac{1}{2}$	-51.39	$\frac{1}{2}$	-53.08	$\frac{1}{2}$	-40.69	$\frac{1}{2}$	-35.85	$\frac{1}{2}$	-17.27	$\frac{1}{2}$	-24.92	$\frac{1}{2}$
4314.891	-49.44	$\frac{1}{2}$	-38.51	$\frac{1}{2}$	-39.40	1	-51.10	1	-32.44	$\frac{1}{2}$	-18.50	$\frac{1}{2}$	-21.40	$\frac{1}{2}$
4294.514	.....	.....	.....	.....	.....	.....	-42.07	$\frac{1}{2}$	-28.26	$\frac{1}{2}$	-28.80	$\frac{1}{2}$	-23.37	$\frac{1}{2}$
4289.872	.....	.....	.....	.....	-38.37	$\frac{1}{2}$	.....	.....	.....	.....	-34.24	$\frac{1}{2}$	-40.62	$\frac{1}{2}$
4128.108	.....	.....	.....	.....	.....	.....	-48.30	$\frac{1}{2}$	.....	.....	-20.88	$\frac{1}{2}$	-31.90	$\frac{1}{2}$
Weighted mean	- 48.54		- 44.90		- 40.55		- 45.41		- 30.02		- 28.53		- 25.48	
V_s	+ 7.39		+ 7.05		+ 6.32		+ 5.75		+ 5.17		+ 4.77		+ 3.36	
V_d	- 0.18		- 0.02		\pm 0.00		- 0.03		- 0.05		- 0.11		+ 0.02	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 41.6		- 38.1		- 34.5		- 40.0		- 25.2		- 24.2		- 22.4	

MEASURES OF 32 α CYGNI—Continued

λ	6275		6300		6306		6355		6362		6368		6384	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-38.43	$\frac{1}{2}$	-40.81	$\frac{1}{2}$	-29.54	$\frac{1}{2}$	-33.52	$\frac{1}{2}$	-26.36	$\frac{1}{2}$	-15.35	$\frac{1}{2}$	-17.61	$\frac{1}{2}$
4549.646	-38.74	$\frac{1}{2}$	-37.67	$\frac{1}{2}$	-27.68	$\frac{1}{2}$	-34.61	$\frac{1}{2}$	-14.48	$\frac{1}{2}$	-26.90	$\frac{1}{2}$	-3.11	$\frac{1}{2}$
4523.052	.....	.....	-32.40	$\frac{1}{2}$	.....	.....	-27.01	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....
4501.865	-44.05	$\frac{1}{2}$	-46.58	$\frac{1}{2}$	-31.29	$\frac{1}{2}$	-27.37	$\frac{1}{2}$	-24.46	$\frac{1}{2}$	-31.29	$\frac{1}{2}$	-23.58	$\frac{1}{2}$
4415.200	-50.60	$\frac{1}{2}$	.....	.....	.....	.....	-34.17	$\frac{1}{2}$	.....	.....	-16.80	$\frac{1}{2}$	-15.97	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	-24.06	$\frac{1}{2}$	.....	.....	-31.38	$\frac{1}{2}$	.....	.....	.....	.....
4395.461	-40.01	$\frac{1}{2}$	-23.25	$\frac{1}{2}$	-14.34	$\frac{1}{2}$	.....	.....	-28.53	$\frac{1}{2}$	-38.25	$\frac{1}{2}$	-19.27	$\frac{1}{2}$
4351.674	-56.11	$\frac{1}{2}$	-44.08	$\frac{1}{2}$	-30.80	$\frac{1}{2}$	-46.07	$\frac{1}{2}$	-28.80	$\frac{1}{2}$	.....	.....	.....	.....
4340.705	-35.29	$\frac{1}{2}$	-44.63	$\frac{1}{2}$	-39.57	1	-45.42	$\frac{1}{2}$	-36.75	1	-43.62	$\frac{1}{2}$	-28.31	$\frac{1}{2}$
4326.076	.....	.....	.....	.....	.....	.....	-24.86	$\frac{1}{2}$	-31.98	$\frac{1}{2}$	.....	.....	-15.96	$\frac{1}{2}$
4314.891	-41.27	$\frac{1}{2}$	-41.60	$\frac{1}{2}$	-36.30	1	-41.16	$\frac{1}{2}$	-33.21	$\frac{1}{2}$	-29.68	1	-22.84	$\frac{1}{2}$
4294.514	-36.63	$\frac{1}{2}$	.....	.....	.....	.....	-38.37	$\frac{1}{2}$	-27.94	$\frac{1}{2}$	-25.98	$\frac{1}{2}$	-17.07	$\frac{1}{2}$
4289.872	.....	.....	.....	.....	-36.64	$\frac{1}{2}$	.....	.....	-31.87	$\frac{1}{2}$	-30.46	$\frac{1}{2}$	-28.62	$\frac{1}{2}$
4271.888	.....	.....	-50.22	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	-28.65	$\frac{1}{2}$	.....	.....
4215.906	.....	.....	.....	.....	-34.56	$\frac{1}{2}$	-39.46	$\frac{1}{2}$	-27.92	$\frac{1}{2}$	-26.70	$\frac{1}{2}$	-31.91	$\frac{1}{2}$
4101.653	.....	.....	.....	.....	.....	.....	.....	.....	-15.91	$\frac{1}{2}$	-20.08	$\frac{1}{2}$	.....	.....
Weighted mean	- 41.18		- 40.94		- 32.95		- 36.59		- 29.32		- 29.18		- 23.58	
V_s	+ 1.44		- 0.70		- 0.91		- 4.51		- 4.76		- 5.15		- 5.56	
V_d	- 0.10		\pm 0.00		+ 0.04		- 0.11		- 0.12		- 0.03		- 0.06	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 40.1		- 41.9		- 34.1		- 41.5		- 34.5		- 34.6		- 29.5	

MEASURES OF 32 θ CYGNI—*Continued*

λ	6415		6425		6438		6453		6503		6511		6541	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-26.10	$\frac{1}{2}$	-15.49	$\frac{1}{2}$	-16.55	$\frac{1}{2}$	-11.64	$\frac{1}{2}$	-25.83	$\frac{1}{2}$	-19.20	$\frac{1}{2}$	-32.19	$\frac{1}{2}$
4549.646	-22.19	$\frac{1}{2}$	-7.68	$\frac{1}{2}$	-22.58	$\frac{1}{2}$	-17.22	$\frac{1}{2}$	-21.02	$\frac{1}{2}$	-29.64	$\frac{1}{2}$	.....	.....
4501.865	-25.35	$\frac{1}{2}$	-12.20	$\frac{1}{2}$	-39.50	$\frac{1}{2}$	-8.00	$\frac{1}{2}$	-28.38	$\frac{1}{2}$	-23.07	$\frac{1}{2}$	-21.05	$\frac{1}{2}$
4415.200	-26.08	$\frac{1}{2}$	-17.99	$\frac{1}{2}$	-20.61	$\frac{1}{2}$	-17.74	$\frac{1}{2}$	-21.08	$\frac{1}{2}$	-16.92	$\frac{1}{2}$	.....	.....
4404.042	.....	.....	-22.41	$\frac{1}{2}$	-36.23	$\frac{1}{2}$	.....	.....	-20.75	$\frac{1}{2}$	-15.91	$\frac{1}{2}$	-15.79	$\frac{1}{2}$
4395.461	-26.53	$\frac{1}{2}$	.....	.....	-27.35	$\frac{1}{2}$	.....	.....	-29.11	$\frac{1}{2}$	-11.53	$\frac{1}{2}$	.....	.....
4351.674	.....	.....	.....	.....	-40.50	$\frac{1}{2}$	.....	.....	-29.60	$\frac{1}{2}$	-33.12	$\frac{1}{2}$	.....	.....
4340.705	-33.26	1	-22.00	1	-27.18	1	-20.31	$\frac{1}{2}$	-14.01	1	-15.13	1	-19.86	$\frac{1}{2}$
4326.076	.....	.....	-21.63	$\frac{1}{2}$	.....	.....	.....	.....	-34.10	$\frac{1}{2}$	.....	.....	-23.63	$\frac{1}{2}$
4314.891	-30.01	$\frac{1}{2}$	-22.50	$\frac{1}{2}$	-29.46	$\frac{1}{2}$	-23.28	$\frac{1}{2}$	-30.45	$\frac{1}{2}$	-28.91	$\frac{1}{2}$	-21.62	$\frac{1}{2}$
4294.514	-25.98	$\frac{1}{2}$	.....	.....	-21.63	$\frac{1}{2}$	-15.22	$\frac{1}{2}$	-15.76	$\frac{1}{2}$	.....	.....	-26.09	$\frac{1}{2}$
4289.872	-35.23	$\frac{1}{2}$	.....	.....	-21.58	$\frac{1}{2}$	-24.51	$\frac{1}{2}$	-24.40	$\frac{1}{2}$	-19.85	$\frac{1}{2}$	-9.56	$\frac{1}{2}$
4271.888	.....	.....	-20.85	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	-20.78	$\frac{1}{2}$	-19.04	$\frac{1}{2}$	-13.12	$\frac{1}{2}$	-17.10	$\frac{1}{2}$	.....	.....	-16.49	$\frac{1}{2}$	.....	.....
4101.653	-32.70	$\frac{1}{2}$	-12.85	$\frac{1}{2}$	-27.69	$\frac{1}{2}$	-24.17	$\frac{1}{2}$	-34.10	$\frac{1}{2}$	.....	.....	.....	.....
Weighted mean	-28.59		-19.19		-26.39		-16.76		-23.50		-20.62		-21.16	
V_a	-6.54		-7.29		-7.83		-8.35		-10.36		-11.25		-12.38	
V_d	-0.11		-0.08		-0.08		-0.03		-0.11		-0.11		-0.16	
Curv.	-0.28		-0.28		-0.28		-0.28		-0.28		-0.28		-0.28	
Radial Velocity	-35.5		-26.8		-34.6		-25.4		-34.3		-32.3		-34.0	

MEASURES OF 32 α CYGNI—*Continued*

λ	6568		6579		6612		6714		6833		6929		6952	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-26.89	$\frac{1}{2}$	-21.89	$\frac{1}{2}$	-22.96	$\frac{1}{2}$	-28.02	$\frac{1}{2}$	-28.20	$\frac{1}{2}$	-23.16	$\frac{1}{2}$	-6.88	$\frac{1}{2}$
4549.646	-25.46	$\frac{1}{2}$	.....	.....	-32.15	$\frac{1}{2}$	-17.85	$\frac{1}{2}$	-53.20	$\frac{1}{2}$	-27.41	$\frac{1}{2}$	-8.34	$\frac{1}{2}$
4523.052	-20.76	$\frac{1}{2}$	.....	.....	-16.77	$\frac{1}{2}$	.....	.....	-35.20	$\frac{1}{2}$	.....	.....	.....	.....
4501.865	-19.62	$\frac{1}{2}$	-6.16	$\frac{1}{2}$	-28.63	$\frac{1}{2}$	-31.94	$\frac{1}{2}$	-28.02	$\frac{1}{2}$	-34.19	$\frac{1}{2}$	.....	.....
4415.200	-3.28	$\frac{1}{2}$	-20.96	$\frac{1}{2}$	-14.27	$\frac{1}{2}$	-28.13	$\frac{1}{2}$	.....	.....	-25.70	$\frac{1}{2}$	+10.21	$\frac{1}{2}$
4404.042	-23.89	$\frac{1}{2}$	-22.23	$\frac{1}{2}$	-21.64	$\frac{1}{2}$	.....	.....	.....	.....	-34.17	$\frac{1}{2}$	-13.78	$\frac{1}{2}$
4395.461	-21.42	$\frac{1}{2}$	+4.17	$\frac{1}{2}$	-37.33	$\frac{1}{2}$	-30.97	$\frac{1}{2}$	.....	.....	.....	.....	-9.54	$\frac{1}{2}$
4351.674	.....	.....	-17.44	$\frac{1}{2}$	-29.49	$\frac{1}{2}$	-15.74	$\frac{1}{2}$	.....	.....	-21.60	$\frac{1}{2}$	+11.53	$\frac{1}{2}$
4340.705	-24.79	$\frac{1}{2}$	.....	.....	-21.96	$\frac{1}{2}$	.....	.....	-31.92	$\frac{1}{2}$	-32.46	$\frac{1}{2}$	-8.94	$\frac{1}{2}$
4326.076	.....	.....	.....	.....	.....	.....	.....	.....	-27.74	$\frac{1}{2}$	-37.65	$\frac{1}{2}$	-26.74	$\frac{1}{2}$
4314.891	-23.81	$\frac{1}{2}$	-20.14	$\frac{1}{2}$	-34.56	$\frac{1}{2}$	-36.34	$\frac{1}{2}$	-24.21	$\frac{1}{2}$	-23.38	$\frac{1}{2}$	-23.90	$\frac{1}{2}$
4294.514	.....	.....	.....	.....	.....	.....	.....	.....	-35.42	$\frac{1}{2}$	.....	.....	.....	.....
4289.872	-22.56	$\frac{1}{2}$	.....	.....	-24.09	$\frac{1}{2}$	-28.23	$\frac{1}{2}$	-35.51	$\frac{1}{2}$	-26.30	$\frac{1}{2}$	-17.80	$\frac{1}{2}$
4271.888	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-19.24	$\frac{1}{2}$	-19.45	$\frac{1}{2}$
4215.906	.....	.....	-11.25	$\frac{1}{2}$	-25.21	$\frac{1}{2}$	-13.10	$\frac{1}{2}$	-41.83	$\frac{1}{2}$	-28.14	$\frac{1}{2}$	-9.34	$\frac{1}{2}$
4128.108	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-26.12	$\frac{1}{2}$	.....	.....
4101.653	.....	.....	.....	.....	.....	.....	.....	.....	-33.69	$\frac{1}{2}$	.....	.....	+9.91	$\frac{1}{2}$
Weighted mean	-22.17		-15.35		-25.70		-26.06		-33.78		-28.10		-10.62	
V _a	-13.07		-13.00		-12.18		-7.68		+2.98		+10.50		+11.30	
V _s	-0.19		-0.21		-0.19		-0.23		+0.19		+0.15		+0.10	
Curv.	-0.28		-0.28		-0.28		-0.28		-0.28		-0.28		-0.28	
Radial Velocity	-35.7		-28.8		-38.4		-34.3		-30.9		-17.7		+0.5	

MEASURES OF 32 ^o CYGNI—Continued

λ	6963		6972		6983		7006		7015		7061		7084	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-32.78	$\frac{1}{2}$	-34.15	$\frac{1}{2}$	-21.50	$\frac{1}{2}$	-18.27	$\frac{1}{2}$	-22.62	$\frac{1}{2}$	-28.20	$\frac{1}{2}$	-6.20	$\frac{1}{2}$
4549.646	-30.60	$\frac{1}{2}$	-36.82	$\frac{1}{2}$	-11.87	$\frac{1}{2}$	-10.81	$\frac{1}{2}$	.....	.....	.....	.....	-4.63	$\frac{1}{2}$
4523.052	-17.64	$\frac{1}{2}$	-24.05	$\frac{1}{2}$	-14.95	$\frac{1}{2}$	.....	.....	-23.29	$\frac{1}{2}$	-17.52	$\frac{1}{2}$	-13.03	$\frac{1}{2}$
4501.865	-31.41	$\frac{1}{2}$	-47.72	$\frac{1}{2}$	-15.74	$\frac{1}{2}$	.....	.....	-5.28	$\frac{1}{2}$	-9.43	$\frac{1}{2}$	-18.02	$\frac{1}{2}$
4415.200	-37.38	$\frac{1}{2}$	-30.96	$\frac{1}{2}$	-25.28	$\frac{1}{2}$	-24.50	$\frac{1}{2}$	-19.72	$\frac{1}{2}$	-23.92	$\frac{1}{2}$	-0.97	$\frac{1}{2}$
4404.042	-43.62	$\frac{1}{2}$	-45.65	$\frac{1}{2}$	-23.73	$\frac{1}{2}$	-30.54	$\frac{1}{2}$	-22.29	$\frac{1}{2}$	-17.93	$\frac{1}{2}$	-17.22	$\frac{1}{2}$
4351.674	-33.93	$\frac{1}{2}$	-37.30	$\frac{1}{2}$	-25.40	$\frac{1}{2}$	.....	.....	-5.83	$\frac{1}{2}$	-23.90	$\frac{1}{2}$	-23.21	$\frac{1}{2}$
4340.705	-31.62	$\frac{1}{2}$	-30.31	$\frac{1}{2}$	-24.01	$\frac{1}{2}$	-24.91	$\frac{1}{2}$	-32.58	$\frac{1}{2}$	-23.11	$\frac{1}{2}$	-2.97	$\frac{1}{2}$
4326.076	-49.25	$\frac{1}{2}$	.....	.....	.....	.....	-17.74	$\frac{1}{2}$	-41.01	$\frac{1}{2}$	.....	.....	.....	.....
4314.891	-24.72	$\frac{1}{2}$	-18.84	$\frac{1}{2}$	-27.02	$\frac{1}{2}$	-16.40	$\frac{1}{2}$	-24.90	$\frac{1}{2}$	-26.10	$\frac{1}{2}$	-10.25	$\frac{1}{2}$
4294.514	.....	.....	.....	.....	-34.14	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4289.872	-34.91	$\frac{1}{2}$	.....	.....	-33.30	$\frac{1}{2}$	-27.20	$\frac{1}{2}$	.....	.....	.....	.....	-23.00	$\frac{1}{2}$
4271.888	-34.21	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	-30.58	$\frac{1}{2}$	.....	.....	-24.66	$\frac{1}{2}$	-38.02	$\frac{1}{2}$	-23.12	$\frac{1}{2}$	-38.88	$\frac{1}{2}$	-14.34	$\frac{1}{2}$
4101.653	.....	.....	.....	.....	.....	.....	.....	.....	-36.00	$\frac{1}{2}$	.....	.....	.....	.....
Weighted mean	-32.64		-34.46		-23.23		-22.73		-23.97		-23.41		-11.32	
V _s	+12.26		+12.43		+12.60		+12.76		+12.68		+11.51		+9.66	
V _z	+0.10		+0.11		+0.12		+0.05		+0.05		+0.03		+0.10	
Curv.	-0.28		-0.28		-0.28		-0.28		-0.28		-0.28		-0.28	
Radial Velocity	-20.6		-22.4		-10.8		-10.2		-11.5		-12.1		-1.8	

MEASURES OF 32 ^o CYGNI—Continued

λ	7090		7102		7110		7129		7149		7165		7187	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	+ 2.54	$\frac{1}{2}$	-16.96	$\frac{1}{2}$	-33.95	$\frac{1}{2}$	-31.10	$\frac{1}{2}$	- 6.47	$\frac{1}{2}$	- 0.63	$\frac{1}{2}$	-16.01	$\frac{1}{2}$
4549.646	-12.39	$\frac{1}{2}$	-19.82	$\frac{1}{2}$	+ 3.42	$\frac{1}{2}$	-26.48	$\frac{1}{2}$	.....	.....	- 7.43	$\frac{1}{2}$	-14.72	$\frac{1}{2}$
4523.052	-19.95	$\frac{1}{2}$	-23.29	$\frac{1}{2}$	.....	.....	-15.97	$\frac{1}{2}$	- 8.79	$\frac{1}{2}$	- 0.85	$\frac{1}{2}$	+22.24	$\frac{1}{2}$
4501.865	-17.13	$\frac{1}{2}$	-27.75	$\frac{1}{2}$	-18.02	$\frac{1}{2}$	-11.33	$\frac{1}{2}$	-10.31	$\frac{1}{2}$	+ 2.58	$\frac{1}{2}$	+ 1.81	$\frac{1}{2}$
4415.200	-16.68	$\frac{1}{2}$	-25.11	$\frac{1}{2}$	- 7.64	$\frac{1}{2}$	- 9.66	$\frac{1}{2}$	+ 6.05	$\frac{1}{2}$	+ 0.46	$\frac{1}{2}$	+ 9.14	$\frac{1}{2}$
4404.042	-24.17	$\frac{1}{2}$	-32.69	$\frac{1}{2}$	-17.32	$\frac{1}{2}$	-12.96	$\frac{1}{2}$	-18.26	$\frac{1}{2}$	.....	.....	-19.46	$\frac{1}{2}$
4351.674	-21.92	$\frac{1}{2}$	-32.58	$\frac{1}{2}$	.....	.....	-39.22	$\frac{1}{2}$	.....	.....	.....	.....	-30.96	$\frac{1}{2}$
4340.705	-27.73	$\frac{1}{2}$	-26.96	$\frac{1}{2}$	-18.16	$\frac{1}{2}$	+ 0.62	$\frac{1}{2}$	+ 4.34	$\frac{1}{2}$	.....	.....	.....	.....
4314.891	- 9.12	$\frac{1}{2}$	-20.82	$\frac{1}{2}$	-27.33	$\frac{1}{2}$	-26.65	$\frac{1}{2}$	+ 0.70	$\frac{1}{2}$	-11.21	$\frac{1}{2}$	+ 4.01	$\frac{1}{2}$
4294.514	-15.11	$\frac{1}{2}$	.....	.....	-26.81	$\frac{1}{2}$	-20.54	$\frac{1}{2}$	-14.13	$\frac{1}{2}$	.....	.....	- 2.40	$\frac{1}{2}$
4289.872	-19.20	$\frac{1}{2}$	-28.30	$\frac{1}{2}$	-18.98	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	-17.91	$\frac{1}{2}$	-27.82	$\frac{1}{2}$	-18.63	$\frac{1}{2}$	.....	.....	-14.04	$\frac{1}{2}$	.....	.....	- 5.88	$\frac{1}{2}$
Weighted mean	- 16.07		- 25.74		- 18.38		- 17.92		- 7.35		- 2.72		- 5.42	
V _o	+ 8.60		+ 7.61		+ 6.67		+ 5.09		+ 2.37		- 0.46		- 2.38	
V _d	- 0.01		- 0.03		- 0.13		- 0.10		- 0.11		- 0.14		- 0.03	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 7.8		- 18.4		- 12.1		- 13.2		- 5.4		- 3.6		- 8.1	

MEASURES OF 32 ^o CYGNI—Continued

λ	7216		7221		7259		7299		7322		7342		7360	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	+28.66	$\frac{1}{2}$	-16.90	$\frac{1}{2}$	+11.38	$\frac{1}{2}$	- 3.02	$\frac{1}{2}$	+ 3.61	$\frac{1}{2}$	+ 2.15	$\frac{1}{2}$	+ 3.54	$\frac{1}{2}$
4549.646	.....	.....	- 5.72	$\frac{1}{2}$	+ 5.26	$\frac{1}{2}$	+ 3.29	$\frac{1}{2}$	+13.22	$\frac{1}{2}$	+ 9.57	$\frac{1}{2}$	.....	.....
4523.052	.....	.....	- 6.88	$\frac{1}{2}$	+ 8.13	$\frac{1}{2}$	+ 5.70	$\frac{1}{2}$	+ 5.58	$\frac{1}{2}$	+ 8.26	$\frac{1}{2}$	+11.19	$\frac{1}{2}$
4501.865	+14.94	$\frac{1}{2}$	+ 4.48	$\frac{1}{2}$	+19.06	$\frac{1}{2}$	- 6.79	$\frac{1}{2}$	-15.12	$\frac{1}{2}$	+ 7.00	$\frac{1}{2}$	+ 5.52	$\frac{1}{2}$
4415.200	+12.13	$\frac{1}{2}$	- 1.21	$\frac{1}{2}$	+ 4.03	$\frac{1}{2}$	+ 6.29	$\frac{1}{2}$	+ 5.45	$\frac{1}{2}$	+14.26	$\frac{1}{2}$	+18.10	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	+ 7.47	$\frac{1}{2}$	+ 0.14	$\frac{1}{2}$	- 0.56	$\frac{1}{2}$	.....	.....	- 6.11	$\frac{1}{2}$
4351.674	.....	.....	.....	.....	- 4.48	$\frac{1}{2}$	+ 2.76	$\frac{1}{2}$	+ 4.38	$\frac{1}{2}$	.....	.....	+10.68	$\frac{1}{2}$
4340.705	+ 2.64	$\frac{1}{2}$	-18.50	$\frac{1}{2}$	- 6.35	$\frac{1}{2}$	+ 6.26	$\frac{1}{2}$	-10.86	$\frac{1}{2}$	.....	.....	+14.22	$\frac{1}{2}$
4314.891	+ 1.01	$\frac{1}{2}$	+ 5.66	$\frac{1}{2}$	+ 3.11	$\frac{1}{2}$	+11.06	$\frac{1}{2}$	- 1.88	$\frac{1}{2}$	+ 2.66	$\frac{1}{2}$	+ 5.82	$\frac{1}{2}$
4294.514	.....	.....	- 4.78	$\frac{1}{2}$	+ 2.29	$\frac{1}{2}$	+ 9.02	$\frac{1}{2}$	+18.22	$\frac{1}{2}$	.....	.....	+ 9.12	$\frac{1}{2}$
4289.872	.....	.....	.....	.....	.....	.....	- 2.32	$\frac{1}{2}$	+10.93	$\frac{1}{2}$	.....	.....	+ 7.68	$\frac{1}{2}$
4215.906	+12.22	$\frac{1}{2}$	- 9.55	$\frac{1}{2}$	- 0.97	$\frac{1}{2}$	+ 3.42	$\frac{1}{2}$	- 3.11	$\frac{1}{2}$	.....	.....	+18.18	$\frac{1}{2}$
Weighted mean	+ 8.55		- 6.79		+ 4.90		+ 2.83		+ 2.66		+ 7.09		+ 9.78	
V _e	- 3.88		- 4.08		- 5.73		- 9.62		- 9.45		- 12.47		- 11.44	
V _s	- 0.11		- 0.02		- 0.09		+ 0.05		- 0.01		- 0.12		- 0.05	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	+ 4.3		- 11.2		- 1.2		- 7.0		- 7.1		- 5.8		- 2.0	

MEASURES OF 32 σ CYGNI—Continued

λ	7371		7376		7395		7424		7434		7448		7451	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	+13.55	$\frac{1}{2}$	+ 7.68	1	+ 1.10	$\frac{1}{2}$	+ 6.46	$\frac{1}{2}$	+ 6.48	$\frac{1}{2}$	+ 6.88	$\frac{1}{2}$	+ 4.36	$\frac{1}{2}$
4549.646	- 1.93	$\frac{1}{2}$	+21.64	$\frac{1}{2}$	- 7.28	$\frac{1}{2}$	+26.24	$\frac{1}{2}$	- 7.08	$\frac{1}{2}$	.....	.....	.....	.....
4523.052	+ 5.95	$\frac{1}{2}$	+ 4.73	$\frac{1}{2}$	+ 7.50	$\frac{1}{2}$	+ 6.80	$\frac{1}{2}$	+14.91	$\frac{1}{2}$	+16.58	$\frac{1}{2}$	+19.80	$\frac{1}{2}$
4501.865	+ 6.98	$\frac{1}{2}$	+21.52	$\frac{1}{2}$	+ 8.62	$\frac{1}{2}$	+15.02	$\frac{1}{2}$	+ 3.10	$\frac{1}{2}$	+ 6.15	$\frac{1}{2}$	+ 7.55	$\frac{1}{2}$
4415.200	+11.52	$\frac{1}{2}$	- 8.89	$\frac{1}{2}$	+ 9.14	$\frac{1}{2}$	+ 7.96	$\frac{1}{2}$	.....	.....	.....	.....	+ 6.52	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	.....	.....	- 0.27	$\frac{1}{2}$	.....	.....	.....	.....	+ 1.01	$\frac{1}{2}$
4351.674	+ 3.82	$\frac{1}{2}$	- 1.18	$\frac{1}{2}$	.....	.....	+ 2.11	$\frac{1}{2}$	- 7.00	$\frac{1}{2}$	- 2.78	$\frac{1}{2}$	- 7.22	$\frac{1}{2}$
4340.705	+ 8.51	$\frac{1}{2}$	+35.92	$\frac{1}{2}$	-12.54	$\frac{1}{2}$	+13.98	$\frac{1}{2}$	+ 7.66	$\frac{1}{2}$	- 7.49	$\frac{1}{2}$	+12.53	$\frac{1}{2}$
4314.891	+ 4.76	$\frac{1}{2}$	- 1.88	$\frac{1}{2}$	+ 3.88	$\frac{1}{2}$	+ 5.37	$\frac{1}{2}$	+ 0.72	$\frac{1}{2}$	-12.88	$\frac{1}{2}$	+ 2.04	$\frac{1}{2}$
4294.514	+ 5.76	$\frac{1}{2}$	.....	.....	+10.41	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4289.872	+ 7.00	$\frac{1}{2}$	.....	.....	.....	.....	+10.18	$\frac{1}{2}$	+ 5.50	$\frac{1}{2}$	+12.57	$\frac{1}{2}$	+2.89	$\frac{1}{2}$
4215.906	+18.85	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	- 0.90	$\frac{1}{2}$	- 1.22	$\frac{1}{2}$	+1.06	$\frac{1}{2}$
Weighted mean	+ 7.18		+ 11.08		+ 2.75		+ 9.32		+ 3.17		+ 2.75		+ 5.50	
V ₀	- 11.94		- 12.57		- 12.91		- 13.08		- 12.88		- 12.29		- 11.42	
V _d	- 0.04		- 0.18		- 0.10		- 0.11		- 0.12		- 0.14		- 0.16	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 5.1		- 2.0		- 10.5		- 4.1		- 10.1		- 10.0		- 6.4	

MEASURES OF 32 ^o CYGNI—Continued

λ	7455		7474		7488		7492		7555		7620		7630	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	+20.46	$\frac{1}{2}$	+14.87	$\frac{1}{2}$	+ 2.48	$\frac{1}{2}$	- 3.24	$\frac{1}{2}$	-12.41	$\frac{1}{2}$	- 3.30	$\frac{1}{2}$	- 4.21	$\frac{1}{2}$
4549.646	+ 9.18	$\frac{1}{2}$	+21.12	$\frac{1}{2}$	- 5.77	$\frac{1}{2}$	+ 9.57	$\frac{1}{2}$	-16.66	$\frac{1}{2}$	+ 0.95	$\frac{1}{2}$	+ 0.81	$\frac{1}{2}$
4523.052	+19.51	$\frac{1}{2}$	+ 7.82	$\frac{1}{2}$	+24.53	$\frac{1}{2}$	+ 6.54	$\frac{1}{2}$	+ 2.41	$\frac{1}{2}$	- 4.95	$\frac{1}{2}$	-10.59	$\frac{1}{2}$
4501.865	+14.25	$\frac{1}{2}$	- 4.65	$\frac{1}{2}$	+ 8.31	$\frac{1}{2}$	+ 8.59	$\frac{1}{2}$	- 0.20	$\frac{1}{2}$	-12.46	$\frac{1}{2}$	-19.03	$\frac{1}{2}$
4415.200	+24.80	$\frac{1}{2}$	+ 9.03	$\frac{1}{2}$	+10.22	$\frac{1}{2}$	.....	.....	+ 6.28	$\frac{1}{2}$	-12.63	$\frac{1}{2}$	- 0.38	$\frac{1}{2}$
4404.042	+11.20	$\frac{1}{2}$	.....	.....	- 4.56	$\frac{1}{2}$	.....	.....	- 1.24	$\frac{1}{2}$	-25.62	$\frac{1}{2}$	+ 5.93	$\frac{1}{2}$
4351.674	+ 3.03	$\frac{1}{2}$	+ 2.69	$\frac{1}{2}$	- 6.44	$\frac{1}{2}$	.....	.....	- 4.28	$\frac{1}{2}$	.....	.....	- 8.56	$\frac{1}{2}$
4340.705	+30.05	$\frac{1}{2}$	+11.96	$\frac{1}{2}$	-13.26	$\frac{1}{2}$	- 8.68	$\frac{1}{2}$	- 2.74	$\frac{1}{2}$	-26.39	$\frac{1}{2}$	-13.44	$\frac{1}{2}$
4314.891	+ 8.69	$\frac{1}{2}$	+ 9.02	$\frac{1}{2}$	+ 6.70	$\frac{1}{2}$	.....	.....	- 0.72	$\frac{1}{2}$	-14.50	$\frac{1}{2}$	-10.88	$\frac{1}{2}$
4294.514	.....	.....	+14.27	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	+ 0.85	$\frac{1}{2}$
4289.872	+11.71	$\frac{1}{2}$	+ 4.30	$\frac{1}{2}$	.....	.....	.....	.....	- 6.79	$\frac{1}{2}$	-10.32	$\frac{1}{2}$	-13.13	$\frac{1}{2}$
4271.888	+11.61	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	+10.14	$\frac{1}{2}$	+12.72	$\frac{1}{2}$	.....	.....	.....	.....	- 1.38	$\frac{1}{2}$	-29.96	$\frac{1}{2}$	- 0.88	$\frac{1}{2}$
Weighted mean	+ 15.89		+ 8.98		+ 2.93		+ 2.32		- 4.26		- 15.01		- 6.99	
V _a	- 10.44		- 9.55		- 7.03		- 4.78		+ 6.06		+ 11.17		+ 12.25	
V _d	- 0.16		- 0.20		- 0.21		- 0.24		+ 0.16		+ 0.12		+ 0.14	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	+ 5.0		- 1.0		- 4.6		- 3.0		+ 1.7		- 4.0		+ 5.1	

MEASURES OF 32 σ CYGNI—*Continued*

λ	7663		7679		7696		7701		7712		7719		7730	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	- 4.21	$\frac{1}{2}$	+ 3.76	$\frac{1}{2}$	+ 2.30	$\frac{1}{2}$	-10.31	$\frac{1}{2}$	-24.36	$\frac{1}{2}$	-25.55	$\frac{1}{2}$	-19.18	$\frac{1}{2}$
4549.646	-11.07	$\frac{1}{2}$	- 0.88	$\frac{1}{2}$	+10.26	$\frac{1}{2}$	-18.68	$\frac{1}{2}$	-29.98	$\frac{1}{2}$	+ 1.34	$\frac{1}{2}$	- 3.50	$\frac{1}{2}$
4523.052	+ 4.67	$\frac{1}{2}$	- 2.00	$\frac{1}{2}$	+ 1.33	$\frac{1}{2}$	+ 4.82	$\frac{1}{2}$	- 4.69	$\frac{1}{2}$	- 9.95	$\frac{1}{2}$	- 7.12	$\frac{1}{2}$
4501.865	- 5.26	$\frac{1}{2}$	- 8.06	$\frac{1}{2}$	-13.47	$\frac{1}{2}$	- 3.38	$\frac{1}{2}$	-34.44	$\frac{1}{2}$	- 2.75	$\frac{1}{2}$	-11.46	$\frac{1}{2}$
4415.200	- 2.27	$\frac{1}{2}$	+ 2.48	$\frac{1}{2}$	.....	.....	+ 0.34	$\frac{1}{2}$	-18.34	$\frac{1}{2}$	-12.02	$\frac{1}{2}$	-10.60	$\frac{1}{2}$
4404.042	.....	.....	-17.33	$\frac{1}{2}$	+ 7.81	$\frac{1}{2}$	-12.25	$\frac{1}{2}$	- 5.76	$\frac{1}{2}$	-16.97	$\frac{1}{2}$	.....	.....
4351.674	.....	.....	.....	.....	.....	.....	-17.62	$\frac{1}{2}$	.....	$\frac{1}{2}$	.....	.....	-12.30	$\frac{1}{2}$
4340.705	-24.36	$\frac{1}{2}$	- 4.66	$\frac{1}{2}$	-13.22	$\frac{1}{2}$	- 6.69	$\frac{1}{2}$	- 4.89	$\frac{1}{2}$	-13.66	$\frac{1}{2}$	-12.54	$\frac{1}{2}$
4314.891	-16.40	$\frac{1}{2}$	- 4.92	$\frac{1}{2}$	-11.12	$\frac{1}{2}$	-12.01	$\frac{1}{2}$	+18.20	$\frac{1}{2}$	- 5.72	$\frac{1}{2}$	-14.76	$\frac{1}{2}$
4294.514	+ 0.44	$\frac{1}{2}$	- 9.46	$\frac{1}{2}$	.....	.....	-20.54	$\frac{1}{2}$	-13.15	$\frac{1}{2}$	-10.02	$\frac{1}{2}$	-31.08	$\frac{1}{2}$
4289.872	.....	.....	-11.08	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4215.906	.....	.....	- 6.28	$\frac{1}{2}$	.....	.....	.....	.....	+13.91	$\frac{1}{2}$	.....	.....	- 0.36	$\frac{1}{2}$
Weighted mean	- 8.80		- 5.39		- 2.30		- 9.64		- 9.84		- 10.56		- 12.78	
V_a	+ 12.96		+ 12.49		+ 11.63		+ 10.82		+ 9.84		+ 8.94		+ 7.67	
V_s	+ 0.19		+ 0.18		+ 0.10		+ 0.05		- 0.09		- 0.09		+ 0.07	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	+ 3.9		+ 7.0		+ 9.1		+ 0.9		- 0.4		- 2.0		- 5.3	

MEASURES OF 32 ^o CYGNI—Continued

λ	7746		7763		7781		7800		7812		7821		7835	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-15.30	½	+ 7.46	½	-14.56	½	- 2.74	½	- 0.50	½	+ 5.60	½	- 0.37	½
4549.646	- 8.47	½	- 5.58	½	.....	.....	.....	.....	+15.97	½	+10.09	½	-17.36	½
4523.052	- 4.56	½	+ 1.34	½	-11.82	½	.....	.....	+ 8.01	½	- 0.97	½	+11.35	½
4501.865	-13.73	½	+ 0.53	½	- 8.59	½	.....	.....	+ 0.44	½	.....	.....	+ 9.54	½
4415.200	.....	.....	+ 1.28	½	.....	.....	+ 0.10	½	+15.09	½	.....	.....	+16.64	½
4404.042	-27.70	½	+ 1.22	½	.....	.....	-12.02	½	+ 9.71	½	.....	.....	- 2.97	½
4351.674	-14.92	½	.....	.....	-23.46	½	- 9.26	½	- 8.35	½	-14.03	½	-10.19	½
4340.705	- 7.81	½	+ 8.84	½	- 5.23	½	+ 1.03	½	+ 4.23	½	.....	.....	- 7.48	½
4314.891	- 6.51	½	-18.83	½	- 6.50	½	+ 2.00	½	+ 3.22	½	- 6.59	½	- 1.97	½
4294.514	-26.29	½	-16.84	½	-11.63	½	.....	.....	.....	.....	.....	.....	.....	.....
4289.872	.....	.....	.....	.....	.....	.....	.....	.....	+ 9.39	½	.....	.....	- 0.79	½
4215.906	.....	.....	+10.26	½	.....	.....	.....	.....	+ 7.41	½	.....	.....	.....	.....
Weighted mean	- 12.75		- 1.59		- 11.48		- 2.22		+ 5.54		- 1.18		- 2.20	
V _a	+ 6.58		+ 4.26		+ 1.33		- 2.10		- 5.45		- 7.55		- 8.60	
V _s	- 0.10		- 0.10		- 0.12		+ 0.04		± 0.00		+ 0.02		- 0.02	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 6.6		+ 2.3		- 10.5		- 4.6		- 0.2		- 9.0		- 11.1	

MEASURES OF 32 θ CYGNI—Continued

λ	7864		7897		7903		7929		8129		8157		8168	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	+ 6.53	$\frac{1}{2}$	+ 8.91	$\frac{1}{2}$	- 6.96	$\frac{1}{2}$	+15.54	$\frac{1}{2}$	- 1.77	$\frac{1}{2}$	-36.26	$\frac{1}{2}$	-19.74	$\frac{1}{2}$
4549.646	.....	.....	- 3.10	$\frac{1}{2}$	-16.52	$\frac{1}{2}$	+13.38	$\frac{1}{2}$	-34.76	$\frac{1}{2}$	-20.72	$\frac{1}{2}$	-35.12	$\frac{1}{2}$
4523.052	+17.00	$\frac{1}{2}$	+ 8.17	$\frac{1}{2}$	+ 1.64	$\frac{1}{2}$	- 5.45	$\frac{1}{2}$	-16.76	$\frac{1}{2}$	-16.89	$\frac{1}{2}$	.....	.....
4501.865	- 2.22	$\frac{1}{2}$	- 5.77	$\frac{1}{2}$	+ 0.20	$\frac{1}{2}$	+ 2.21	$\frac{1}{2}$	-13.40	$\frac{1}{2}$	-21.65	$\frac{1}{2}$	-31.16	$\frac{1}{2}$
4415.200	.....	.....	.....	.....	.....	.....	.....	.....	-22.62	$\frac{1}{2}$	-18.33	$\frac{1}{2}$	-34.78	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	- 7.88	$\frac{1}{2}$	-29.04	$\frac{1}{2}$
4351.674	+ 1.78	$\frac{1}{2}$	+ 3.92	$\frac{1}{2}$	- 3.48	$\frac{1}{2}$	- 4.38	$\frac{1}{2}$	.....	.....	-37.15	$\frac{1}{2}$	-27.42	$\frac{1}{2}$
4340.705	-10.96	$\frac{1}{2}$	.....	.....	+ 6.31	$\frac{1}{2}$	+ 5.74	$\frac{1}{2}$	-11.45	$\frac{1}{2}$	-34.74	$\frac{1}{2}$	-37.30	$\frac{1}{2}$
4314.891	+ 3.11	$\frac{1}{2}$	- 3.50	$\frac{1}{2}$	+ 4.20	$\frac{1}{2}$	+ 5.71	$\frac{1}{2}$	.....	.....	-31.80	$\frac{1}{2}$	-25.85	$\frac{1}{2}$
4294.514	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-30.30	$\frac{1}{2}$	-43.80	$\frac{1}{2}$
4289.872	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-36.82	$\frac{1}{2}$	-25.48	$\frac{1}{2}$
4215.906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-47.82	$\frac{1}{2}$	-20.47	$\frac{1}{2}$
Weighted mean	+ 2.54		+ 1.44		- 2.09		+ 6.85		- 14.65		- 29.04		- 29.80	
V_s	- 9.72		- 12.92		- 13.08		- 11.87		+ 7.68		+ 11.54		+ 12.69	
V_d	- 0.04		- 0.05		- 0.14		- 0.12		+ 0.19		+ 0.10		+ 0.09	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 7.5		- 11.8		- 15.6		- 5.4		- 7.1		- 17.7		- 17.3	

MEASURES OF 32 ^o CYGNI—Continued

λ	8189		8196		8204		8212		8215		8224		8230	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-37.50	$\frac{1}{2}$	-31.10	$\frac{1}{2}$	-15.26	$\frac{1}{2}$	-25.58	$\frac{1}{2}$	-18.92	$\frac{1}{2}$	-21.04	$\frac{1}{2}$	-20.13	$\frac{1}{2}$
4549.646	-21.15	$\frac{1}{2}$	-35.15	$\frac{1}{2}$	-20.22	$\frac{1}{2}$	-20.22	$\frac{1}{2}$	-26.54	$\frac{1}{2}$	-15.82	$\frac{1}{2}$	-3.63	$\frac{1}{2}$
4523.052	-27.52	$\frac{1}{2}$	-26.22	$\frac{1}{2}$	-30.99	$\frac{1}{2}$	-33.05	$\frac{1}{2}$	-21.75	$\frac{1}{2}$	-11.10	$\frac{1}{2}$	-14.31	$\frac{1}{2}$
4501.865	-45.81	$\frac{1}{2}$	-27.62	$\frac{1}{2}$	-30.90	$\frac{1}{2}$	-43.16	$\frac{1}{2}$	-31.16	$\frac{1}{2}$	-32.30	$\frac{1}{2}$	-18.39	$\frac{1}{2}$
4415.200	-46.31	$\frac{1}{2}$	.....	.....	-34.88	$\frac{1}{2}$	-36.21	$\frac{1}{2}$	-13.71	$\frac{1}{2}$	-24.55	$\frac{1}{2}$	-27.40	$\frac{1}{2}$
4404.042	-23.10	$\frac{1}{2}$	.....	.....	.....	.....	-26.42	$\frac{1}{2}$	-20.04	$\frac{1}{2}$	.....	.....	-18.75	$\frac{1}{2}$
4340.705	-39.24	$\frac{1}{2}$	-30.00	$\frac{1}{2}$	.....	.....	-31.69	$\frac{1}{2}$	-27.18	$\frac{1}{2}$	-40.48	$\frac{1}{2}$	-20.98	$\frac{1}{2}$
4314.891	-21.98	$\frac{1}{2}$	-32.22	$\frac{1}{2}$	-34.35	$\frac{1}{2}$	-23.30	$\frac{1}{2}$	-29.12	$\frac{1}{2}$	-12.78	$\frac{1}{2}$	-18.65	$\frac{1}{2}$
4294.514	-38.26	$\frac{1}{2}$	.....	.....	.....	.....	-32.83	$\frac{1}{2}$	-30.12	$\frac{1}{2}$	.....	.....	-15.76	$\frac{1}{2}$
4289.872	.....	.....	.....	.....	.....	.....	.....	.....	-49.76	$\frac{1}{2}$	.....	.....	.....	.....
4215.906	.....	.....	.....	.....	.....	.....	.....	.....	-24.04	$\frac{1}{2}$	.....	.....	.....	.....
Weighted mean	- 33.76		- 30.43		- 27.47		- 28.46		- 27.44		- 22.41		- 16.96	
V _a	+ 12.54		+ 11.28		+ 10.94		+ 10.09		+ 9.13		+ 7.36		+ 6.63	
V _s	+ 0.05		- 0.03		- 0.03		- 0.05		- 0.09		+ 0.04		- 0.05	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 21.9		- 19.4		- 16.8		- 18.7		- 18.7		- 15.3		- 11.7	

MEASURES OF 32 σ CYGNI—Continued

λ	8242		8248		8261		8270		8271		8277		8284	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4571.896	-19.34	$\frac{1}{2}$	-25.56	$\frac{1}{2}$	-29.30	$\frac{1}{2}$	-10.31	$\frac{1}{2}$	-34.42	$\frac{1}{2}$	-16.28	$\frac{1}{2}$	-26.89	$\frac{1}{2}$
4549.646	-3.37	$\frac{1}{2}$	-26.63	$\frac{1}{2}$	-32.92	$\frac{1}{2}$	-23.38	$\frac{1}{2}$	-32.00	$\frac{1}{2}$	-21.92	$\frac{1}{2}$	-12.00	$\frac{1}{2}$
4523.052	-24.32	$\frac{1}{2}$	-20.85	$\frac{1}{2}$	-28.42	$\frac{1}{2}$	-26.12	$\frac{1}{2}$	-32.66	$\frac{1}{2}$	-19.60	$\frac{1}{2}$	-7.64	$\frac{1}{2}$
4501.865	-44.56	$\frac{1}{2}$	-36.98	$\frac{1}{2}$	-22.97	$\frac{1}{2}$	-22.94	$\frac{1}{2}$	-35.34	$\frac{1}{2}$	-26.86	$\frac{1}{2}$	-24.84	$\frac{1}{2}$
4415.200	-17.05	$\frac{1}{2}$	-29.41	$\frac{1}{2}$	-21.56	$\frac{1}{2}$	-18.59	$\frac{1}{2}$	.....	.....	-13.00	$\frac{1}{2}$	-6.93	$\frac{1}{2}$
4404.042	.....	.....	.....	.....	-23.58	$\frac{1}{2}$	.....	.....	.....	.....	-16.15	$\frac{1}{2}$	-21.58	$\frac{1}{2}$
4340.705	-27.18	$\frac{1}{2}$	-16.15	$\frac{1}{2}$	-19.41	$\frac{1}{2}$	-11.98	$\frac{1}{2}$	-27.19	$\frac{1}{2}$	-26.61	$\frac{1}{2}$	-17.38	$\frac{1}{2}$
4314.891	-15.89	$\frac{1}{2}$	-19.78	$\frac{1}{2}$	-17.97	$\frac{1}{2}$	-21.40	$\frac{1}{2}$	-32.99	$\frac{1}{2}$	-18.10	$\frac{1}{2}$	-21.74	$\frac{1}{2}$
4294.514	.....	.....	.....	.....	-24.12	$\frac{1}{2}$	.....	.....	.....	.....	-18.91	$\frac{1}{2}$	.....	.....
4289.872	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-22.99	$\frac{1}{2}$	-21.59	$\frac{1}{2}$
4215.906	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	-22.11	$\frac{1}{2}$	.....	.....
Weighted mean	-21.68		-24.38		-24.66		-19.25		-32.43		-20.32		-19.50	
V_s	+5.50		+4.55		+3.08		+0.32		+0.07		-2.08		-3.57	
V_d	-0.09		-0.10		-0.11		-0.03		-0.17		-0.12		-0.10	
Curv.	-0.28		-0.28		-0.28		-0.28		-0.28		-0.28		-0.28	
Radial Velocity	-16.5		-20.2		-22.0		-19.2		-32.8		-22.8		-23.4	

MEASURES OF 32 ^o CYGNI—*Concluded*

λ	8299		8302		8327		8353		8402		Vel.	Wt.	Vel.	Wt.
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.				
4571.896	- 3.15	$\frac{1}{2}$	-16.93	$\frac{1}{2}$	-39.21	$\frac{1}{2}$	-38.01	$\frac{1}{2}$	-19.50	$\frac{1}{2}$	.....	.....	.....	.....
4549.646	- 4.15	$\frac{1}{4}$	-19.32	$\frac{1}{2}$	-28.29	$\frac{1}{4}$	-29.52	$\frac{1}{2}$	-25.32	$\frac{1}{2}$	.....	.....	.....	.....
4523.052	-19.06	$\frac{1}{2}$	- 9.30	$\frac{1}{2}$	-20.38	$\frac{1}{4}$	-24.37	$\frac{1}{2}$	-19.22	$\frac{1}{2}$	.....	.....	.....	.....
4501.865	-20.68	$\frac{1}{2}$	-14.10	$\frac{1}{2}$	-32.95	$\frac{1}{2}$	-21.52	$\frac{1}{2}$	-28.89	$\frac{1}{2}$	.....	.....	.....	.....
4415.200	-13.59	$\frac{1}{4}$	- 9.06	$\frac{1}{4}$	-47.15	$\frac{1}{4}$	-34.95	$\frac{1}{2}$	-23.95	$\frac{1}{2}$	.....	.....	.....	.....
4404.042	-29.85	$\frac{1}{2}$	-15.20	$\frac{1}{2}$	-28.32	$\frac{1}{2}$	-20.58	$\frac{1}{2}$	-23.76	$\frac{1}{2}$	.....	.....	.....	.....
4340.705	-11.20	$\frac{1}{2}$	-20.88	$\frac{1}{2}$	-37.59	$\frac{1}{2}$	-50.02	$\frac{1}{2}$	-31.58	$\frac{1}{2}$	.....	.....	.....	.....
4314.891	-21.65	$\frac{1}{2}$	-22.30	$\frac{1}{2}$	-26.25	$\frac{1}{4}$	-25.45	$\frac{1}{2}$	-38.90	$\frac{1}{2}$	.....	.....	.....	.....
4294.514	.....	.....	-18.48	$\frac{1}{2}$	.....	.....	-36.40	$\frac{1}{2}$	-28.99	$\frac{1}{2}$	.....	.....	.....	.....
4289.872	-25.18	$\frac{1}{2}$	.....	.....	.....	.....	-24.42	$\frac{1}{4}$	.....	.....	.....	.....	.....	.....
4271.888	.....	.....	.....	.....	.....	.....	.....	.....	-20.78	$\frac{1}{2}$	.....	.....	.....	.....
4215.906	.....	.....	-11.59	$\frac{1}{4}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Weighted mean	- 16.03		- 17.00		- 33.26		- 31.81		- 26.52		.....	.....	.....	.....
V _s	- 5.00		- 6.97		- 10.67		- 12.97		- 10.15		.....	.....	.....	.....
V _d	- 0.04		- 0.09		- 0.09		- 0.14		- 0.16		.....	.....	.....	.....
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		.....	.....	.....	.....
Radial Velocity	- 21.4		- 24.3		- 43.3		- 45.2		- 37.1		.....	.....	.....	.....

The plates were grouped into twelve normal places found in Table V.

TABLE V

No.	Julian Day	Phase	Velocity	Weight	Residual
1.....	2,420,510.835	795.708	-30.1	4	-1.6
2.....	543.658	867.018	-35.4	3	+0.2
3.....	495.178	964.788	-33.6	1	-2.1
4.....	629.599	1099.209	-13.1	1.5	+0.8
5.....	716.627	16.237	-7.8	2	+1.3
6.....	801.337	100.947	-5.9	2	±0.0
7.....	882.701	182.311	-1.4	1	-2.1
8.....	2,421,007.588	307.198	+3.7	1	-1.9
9.....	076.982	376.592	-3.4	1.5	-1.7
10.....	166.664	466.274	-10.1	1	+4.5
11.....	2,240,272.465	635.711	-14.9	2	+1.6
12.....	2,421,443.212	742.822	-20.1	2	+1.6

A curve running through the normal places has some similarity to that which would be given by the blending of the lines of the primary star by those of a secondary star, but the deviation from the elliptic form takes place unsymmetrically in such a way as to be hardly thus accountable. Also, there seems to be no widening of the lines at any place in the orbit and it seems as though the irregularities in the curve are due to actual variations in the motion of the light-giving body. It was therefore attempted to run an elliptical curve, as closely as possible, through the normal places and apply a secondary correction to this by introducing a circular curve of one-third the period.

A least-squares solution was carried through, which resulted in slight corrections to the elements and a reduction of the value of Σpvv from 75 to 60. The preliminary and final values of the elements are given below. Probable errors were computed and are appended to the final values.

Element	Preliminary	Final
P	1170 days.....	1170 days
e	0.2.....	0.182 ±0.053
ω	280°.....	281°.05 ±4°.8
K	16 km.....	16.64 km. ±0.93 km.
T	2,420,700.25 J.D.....	2,420,700.39 J.D. ±18.7 d.
γ	-14.6 km.....	-14.35 km. ±0.65 km.
K_1	6 km.....	5.86 km. ±0.90 km.
T_1	2,420,515 J.D.....	2,420,515.821 J.D. ±12.4 d.
$a \sin i$		263,250,000 km.
$\frac{m_1^3 \sin^3 i}{(m_1 + m)^3}$		0.53 ☉

To explain the curves one would have to consider the system as consisting of a light-giving body revolving about another body in a circular orbit in 390 days and these two about a third in an elliptic orbit in 1170 days (fig. 2).

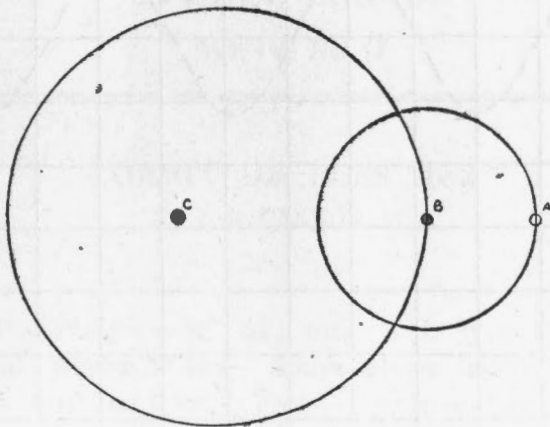


Fig. 2

In fig. 1 the single circles represent the Ottawa normal places, the double circles Küstner's observations, and the triple circles the Lick observations.

Dominion Observatory

Ottawa

February, 1918.

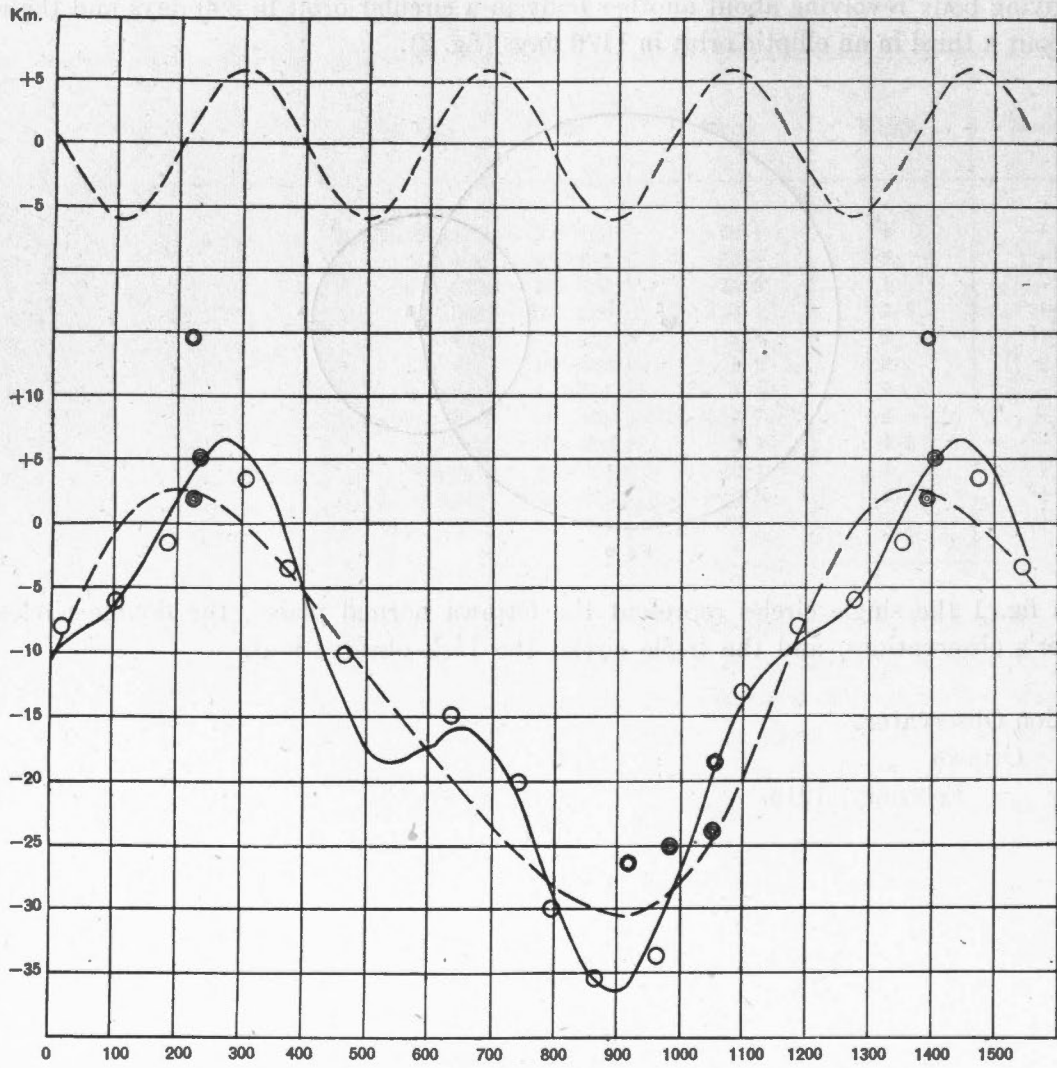


Fig. 1--Radial Velocity Curve of 32 β^2 Cygni