

DEPARTMENT OF THE INTERIOR

CANADA

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PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

W. F. KING, C.M.G., LL.D., *Director.*

Vol. I, No. 14

Orbit of  $\beta$  Coronæ Borealis

BY

J. B. CANNON, M. A.

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OTTAWA

GOVERNMENT PRINTING BUREAU

1914

63219—1

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## ORBIT OF $\beta$ CORONÆ BOREALIS.

BY J. B. CANNON, M.A.

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This star has been under observation here during the years 1910-12. It was first announced as a binary by Mr. Moore in *L.O.B.* IV, 162, from eight measures giving a range from  $-16$  to  $-33$  km. The observations here show a range of approximately the same magnitude. The errors of measurement were, however, considered so large that it was doubted whether any orbit could be determined. For a time micrometer measures were made, but the uncertainty of the wave-lengths of the better lines led to the abandonment of this method. A solar standard was then used in measuring a few plates on the Zeiss Comparator, but the lines in the sun and in the star were so different that the results were very unreliable. Finally, a wide spectrum of the star itself was obtained and used as the standard in the measurement of all the plates and these measures were taken as fairly reliable. The standard used was plate number 4330. The velocity of the standard was determined by micrometer measurement and also by measuring on the Zeiss Comparator against a solar standard. The mean,  $-18.6$  km., was accepted as the velocity of the plate. If this varies to any extent from the true value, it makes no difference to the form of the orbit, but only alters the position of the  $\gamma$  line.

One hundred and fifty three plates were taken and measured, but even with this large number of observations the results did not at once promise the finding of any period of oscillation. However, plotting the observations consecutively gave an indication of a period of about forty days. When further work had been done it was found that 40.9 days fitted the observations as a whole, perhaps, better than any other. This consecutive plotting of observations further showed that the maximum in the various oscillations did not reach the same velocity, but varied to the extent of

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about 4.8 km.; and showed also that a certain value of the maximum was repeated in about twelve periods or 490.8 days. This seemed to indicate a three body system, the body which gives the spectrum measured revolving about another in 40.9 days, and the two, with a third, forming a period of perturbation of 490.8 days. A sine curve was assumed for the long oscillation and the values given by it applied to the velocities obtained from the different plates. In order to get a curve for the short period and to use all the observations in the determination of this curve, a standard maximum was adopted at  $-16.8$  km., and the various periods reduced to this standard by adding or subtracting as the case might be. The sine curve mentioned above was taken with an amplitude of 4.8 km., its up-curve crossing the zero line at Julian Day 2,418,804.4 and its maximum being  $+3.2$  km., and its minimum,  $-1.6$  km. The various values given by this were read off and added to the velocity given by each plate. This very much improved the state of affairs and when the observations were plotted with these corrections the form of the curve was clearly seen, although it must be admitted that some of the residuals were rather large.

The observations are given in Table I. V, in cases where two plates were taken on the same day, is the mean of the velocities obtained for the two.

TABLE I.  
OBSERVATIONS OF  $\beta$  CORONÆ BOREALIS.

Plate	Observer*	Date	Exposure	Julian Day	Phase	Vel. (V)	Wt.	Correction for 3rd body	Vel. (V <sub>1</sub> )	O-C
		1910	m.							
3220	C	Feb. 23.....	44	2,418,726.93	28.54	- 24.5	3.2	- 1.6	-26.1	- 3.9
3221	C	Feb. 23.....	40	.....	.....	.....	2.5	.....	.....	.....
3302	C	Mar. 9.....	50	740.89	1.60	- 22.8	1.7	- 1.4	-24.2	- 2.6
3303	C	Mar. 9.....	35	.....	.....	.....	1.7	.....	.....	.....
3384	H	April 11.....	24	773.80	34.51	- 30.0	2.2	- 0.8	-30.8	- 6.4
3389	P <sup>1</sup>	April 12.....	35	774.85	35.56	- 25.3	1.7	- 0.8	-26.1	- 1.6
3413	C	April 27.....	30	789.80	9.61	- 27.9	2.0	- 0.4	-28.3	- 9.4
3414	C	April 27.....	24	.....	.....	.....	2.5	.....	.....	.....
3421	C	May 4.....	60	796.77	16.58	- 29.6	1.2	- 0.2	-29.8	-10.1
3486	P	June 18.....	40	841.68	19.79	- 21.8	2.7	+ 1.2	-20.6	- 0.3
3502	C	June 29.....	38	852.73	31.64	- 25.7	2.5	+ 1.4	-24.3	- 1.0
3514	H	July 6.....	39	859.70	38.61	- 27.4	2.0	+ 1.6	-25.8	- 0.9
3595	C	Aug. 29.....	30	913.58	10.69	- 21.5	2.0	+ 2.8	-18.7	+ 0.3
3628	C	Sept. 9.....	35	924.52	21.63	- 17.5	2.7	+ 3.0	-14.5	+ 6.1
3629	C	Sept. 9.....	30	.....	.....	.....	3.0	.....	.....	.....
		1911								
4027	P <sup>1</sup>	Feb. 27.....	53	9,095.87	29.38	- 22.1	.5	+ 0.3	-21.8	+ 0.4
4028	P <sup>1</sup>	Feb. 27.....	49	.....	.....	.....	3.5	.....	.....	.....
4065	P <sup>1</sup>	Mar. 6.....	61	102.89	36.40	- 22.9	2.0	+ 0.1	-22.8	+ 1.9
4075	P	Mar. 7.....	75	103.90	37.41	- 30.2	6.5	+ 0.1	-30.1	- 5.3
4084	C	Mar. 8.....	45	104.83	38.34	- 25.8	2.2	± 0.0	-25.8	- 0.8
4085	C	Mar. 8.....	53	.....	.....	.....	.7	.....	.....	.....
4097	P <sup>1</sup>	Mar. 10.....	29	106.94	40.45	- 23.2	5.0	± 0.0	-23.2	+ 0.8
4127	P <sup>1</sup>	Mar. 16.....	30	112.94	5.55	- 17.6	4.5	- 0.2	-17.8	+ 1.3
4149	P	Mar. 28.....	35	124.90	17.51	- 22.4	3.2	- 0.5	-22.9	- 3.0
4150	P	Mar. 28.....	35	.....	.....	.....	3.5	.....	.....	.....
4160	H	April 2.....	30	129.89	22.50	- 20.5	4.5	- 0.6	-21.1	- 0.3
4161	H	April 2.....	32	.....	.....	.....	4.0	.....	.....	.....
4166	P <sup>1</sup>	April 3.....	33	130.84	23.46	- 23.0	3.7	- 0.6	-23.6	- 2.6
4167	P <sup>1</sup>	April 3.....	33	.....	.....	.....	2.0	.....	.....	.....
4184	P <sup>1</sup>	April 10.....	25	137.90	30.51	- 21.6	3.0	- 0.8	-22.4	+ 0.4
4192	P	April 11.....	30	138.84	31.45	- 26.1	4.0	- 0.8	-26.9	- 3.8
4193	P	April 11.....	30	.....	.....	.....	3.7	.....	.....	.....
4199	P	April 17.....	35	144.76	37.37	- 26.0	4.0	- 1.0	-27.0	- 2.0
4209	P <sup>1</sup>	April 18.....	35	145.88	38.49	- 27.2	4.0	- 1.0	-28.2	- 3.2
4210	P <sup>1</sup>	April 18.....	34	.....	.....	.....	3.5	.....	.....	.....
4224	H	April 20.....	33	147.79	40.40	- 22.9	3.5	- 1.0	-23.9	+ 0.1
4243	H	April 23.....	31	150.77	2.48	- 28.0	3.5	- 1.1	-29.1	- 8.5
4244	H	April 23.....	30	.....	.....	.....	3.0	.....	.....	.....
4261	P	April 25.....	40	152.83	4.54	- 27.0	3.5	- 1.1	-28.1	- 8.7
4262	P	April 25.....	50	.....	.....	.....	3.0	.....	.....	.....
4268	C	April 26.....	30	153.82	5.53	- 15.6	3.5	- 1.1	-16.7	+ 2.4
4269	C	April 26.....	30	.....	.....	.....	3.0	.....	.....	.....

OBSERVATIONS OF  $\beta$  CORONÆ BOREALIS—Continued.

Plate	Observer*	Date	Exposure m.	Julian Day	Phase	Vel. (V)	Wt.	Correction for 3rd body	Vel. (V <sup>2</sup> )	O-C
		1911								
4276	C-P <sup>1</sup>	April 28.....	40	2,419, 155.74	7.45	- 23.5	2.2	- 1.2	-24.7	- 5.8
4277	P <sup>1</sup>	April 28.....	29				2.7			
4297	P <sup>1</sup>	May 5.....	30	162.76	14.47	- 21.0	3.7	- 1.3	-22.3	- 2.9
4298	P <sup>1</sup>	May 5.....	65				3.5			
4313	P <sup>1</sup>	May 19.....	45	176.80	23.51	- 20.5	3.5	- 1.4	-21.9	- 0.3
4314	P <sup>1</sup>	May 19.....	87				4.0			
4316	H	May 21.....	30	178.80	30.51	- 23.7	2.2	- 1.5	-25.2	- 2.4
4317	H	May 21.....	30				2.7			
4321	H	May 25.....	30	182.66	34.37	- 27.4	2.7	- 1.5	-28.9	- 4.7
4322	H	May 25.....	54				3.0			
4334	P <sup>1</sup>	May 29.....	47	186.76	38.47	- 23.8	3.5	- 1.6	-25.4	- 0.4
4335	P <sup>1</sup>	May 29.....	64				1.7			
4339	H-P	May 30.....	30	187.76	39.47	- 24.5	3.5	- 1.6	-26.1	- 1.5
4340	P	May 30.....	40				3.5			
4345	C	June 1.....	30	189.72	0.53	- 20.8	2.5	- 1.6	-22.4	+ 0.4
4346	C-H	June 1.....	33				2.7			
4353	P <sup>1</sup>	June 2.....	34	190.72	1.53	- 19.3	2.5	- 1.6	-20.9	+ 0.8
4363	C	June 9.....	30	197.64	8.45	- 15.8	3.5	- 1.6	-17.4	+ 1.4
4364	C	June 9.....	30				2.5			
4369	P-LC	June 16.....	30	204.72	16.53	- 14.6	3.2	- 1.6	-16.2	+ 3.4
4370	C	June 16.....	30				3.0			
4375	H	June 20.....	30	208.63	19.44	- 19.0	3.5	- 1.6	-20.6	- 0.4
4376	H	June 20.....	30				2.5			
4379	P	June 22.....	45	210.62	21.43	- 19.0	3.0	- 1.6	-20.6	± 0.0
4380	P	June 22.....	45				3.0			
4383	C	June 23.....	30	211.65	22.46	- 19.8	3.0	- 1.6	-21.4	- 0.6
4384	C	June 23.....	49				3.0			
4392	C	June 28.....	33	216.64	27.45	- 15.2	2.7	- 1.5	-16.7	+ 5.2
4393	C	June 28.....	64				5.0			
4394	P	June 29.....	40	217.58	28.39	- 21.9	2.0	- 1.5	-23.4	- 1.2
4395	P	June 29.....	35				2.5			
4402	P <sup>1</sup>	June 30.....	30	218.67	29.48	- 19.4	3.0	- 1.5	-20.9	+ 1.6
4403	P <sup>1</sup>	June 30.....	29				2.5			
4406	C	July 3.....	30	221.63	32.44	- 13.3	3.5	- 1.5	-14.8	+ 8.7
4407	C	July 3.....	34				2.2			
4415	P	July 6.....	35	224.59	35.40	- 18.1	2.2	- 1.4	-19.5	+ 5.0
4424	P <sup>1</sup>	July 12.....	35	230.56	0.47	- 15.3	2.7	- 1.4	-16.7	+ 6.2
4432	C	July 14.....	30	232.62	2.53	- 11.1	2.5	- 1.4	-12.5	+ 8.1
4433	H	July 18.....	30	236.57	6.38	- 21.5	3.7	- 1.3	-22.8	- 3.8
4434	H	July 18.....	35				2.7			
4439	P	July 20.....	35	238.57	8.48	- 15.0	3.5	- 1.3	-16.3	+ 2.5
4442	P <sup>1</sup>	July 21.....	35	239.56	9.47	- 21.0	3.7	- 1.2	-22.2	- 3.4
4443	P <sup>1</sup>	July 21.....	32				4.0			
4449	C	July 24.....	45	242.68	12.57	- 17.9	3.5	- 1.2	-19.1	± 0.0
4450	C	July 24.....	40				3.5			
4486	C	Aug. 14.....	30	263.55	33.46	- 19.6	3.0	- 0.8	-20.4	+ 3.4
4487	C	Aug. 14.....	44				2.7			

OBSERVATIONS OF  $\beta$  CORONÆ BOREALIS—Continued.

Plate	Observer*	Date	Exposure	Julian Day	Phase	Vel. (V)	Wt.	Correction for 3rd body	Vel. (V <sup>1</sup> )	O-C
		1912	m.							
4898	C	Mar. 18.....	35	2,419, 480.86	5.37	- 18.8	2.7	+ 3.0	-15.8	+ 3.3
4899	C	Mar. 18.....	35	.....	.....	.....	1.5	.....	.....	.....
4911	P	Mar. 22.....	35	484.82	9.33	- 30.8	2.7	+ 3.0	-27.8	- 9.0
4912	P	Mar. 22.....	35	.....	.....	.....	2.5	.....	.....	.....
4919	P <sup>1</sup>	Mar. 25.....	35	487.83	12.34	- 23.4	2.5	+ 2.9	-20.5	- 1.4
4920	P <sup>1</sup>	Mar. 25.....	33	.....	.....	.....	2.0	.....	.....	.....
4927	C	Mar. 29.....	50	491.85	16.36	- 20.6	1.7	+ 2.8	-17.8	+ 1.8
4928	C	Mar. 29.....	55	.....	.....	.....	3.2	.....	.....	.....
4931	P	Mar. 31.....	35	493.78	18.29	- 26.8	1.7	+ 2.8	-24.0	- 4.0
4932	P	Mar. 31.....	35	.....	.....	.....	1.7	.....	.....	.....
4937	C	April 3.....	40	496.81	21.32	- 26.0	2.5	+ 2.7	-23.3	- 2.7
4938	C	April 3.....	40	.....	.....	.....	1.0	.....	.....	.....
4950	H	April 11.....	34	504.82	29.33	- 27.8	2.2	+ 2.6	-25.2	- 2.8
4951	H	April 11.....	34	.....	.....	.....	2.0	.....	.....	.....
4956	C	April 12.....	40	505.79	30.30	- 23.6	2.0	+ 2.5	-21.1	+ 1.7
4957	C	April 12.....	45	.....	.....	.....	2.2	.....	.....	.....
4961	P <sup>1</sup>	April 16.....	75	509.87	34.38	- 22.0	2.7	+ 2.4	-19.6	+ 4.6
4969	P <sup>1</sup>	April 19.....	34	512.78	37.29	- 28.1	3.0	+ 2.4	-25.7	- 0.8
4973	P	April 20.....	40	513.74	38.25	- 29.8	1.5	+ 2.4	-27.4	- 2.4
4974	P	April 20.....	35	.....	.....	.....	1.7	.....	.....	.....
4980	C	April 23.....	40	516.80	0.39	- 21.1	2.0	+ 2.3	-18.8	+ 4.3
4981	C	April 23.....	42	.....	.....	.....	1.7	.....	.....	.....
4984	H	April 25.....	44	518.77	2.38	- 17.9	1.7	+ 2.3	-15.6	+ 5.3
4985	H	April 25.....	52	.....	.....	.....	2.5	.....	.....	.....
4988	P	April 27.....	43	520.77	4.38	- 21.9	1.5	+ 2.2	-19.7	- 0.8
4990	P <sup>1</sup>	April 29.....	40	522.77	6.38	- 14.3	2.0	+ 2.2	-12.1	+ 6.8
4991	P <sup>1</sup>	April 29.....	37	.....	.....	.....	1.5	.....	.....	.....
4996	C	April 30.....	42	523.80	7.41	- 19.9	2.2	+ 2.1	-17.8	+ 1.1
4997	C	April 30.....	40	.....	.....	.....	1.2	.....	.....	.....
5001	H	May 2.....	40	525.76	9.37	- 14.6	2.2	+ 2.1	-12.5	+ 6.3
5002	H	May 2.....	44	.....	.....	.....	1.7	.....	.....	.....
5007	P <sup>1</sup>	May 3.....	45	526.76	10.37	- 20.6	1.7	+ 2.0	-18.6	+ 0.3
5008	P <sup>1</sup>	May 3.....	41	.....	.....	.....	2.0	.....	.....	.....
5011	P <sup>1</sup>	May 10.....	52	533.79	17.40	- 19.6	2.2	+ 1.9	-17.7	+ 2.1
5012	P <sup>1</sup>	May 10.....	39	.....	.....	.....	1.7	.....	.....	.....
5016	H	May 14.....	81	537.70	21.31	- 19.5	2.0	+ 1.8	-17.7	+ 2.8
5018	P <sup>1</sup>	May 15.....	60	538.68	22.29	- 25.0	1.2	+ 1.7	-23.3	- 2.5
5019	P <sup>1</sup>	May 15.....	37	.....	.....	.....	.7	.....	.....	.....
5023	P	May 23.....	60	546.62	31.23	- 17.1	2.2	+ 1.5	-15.6	+ 7.4
5027	H	May 31.....	64	554.70	39.31	- 17.9	1.7	+ 1.2	-16.7	+ 8.1
5028	H-P <sup>1</sup>	May 31.....	45	.....	.....	.....	2.2	.....	.....	.....
5032	P <sup>1</sup>	June 5.....	46	559.64	3.31	- 15.2	2.0	+ 1.1	-14.1	+ 5.9
5035	H	June 6.....	33	560.69	4.36	- 20.3	1.5	+ 1.1	-19.2	+ 0.3
5036	H	June 6.....	40	.....	.....	.....	2.7	.....	.....	.....
5041	H-P <sup>1</sup>	June 7.....	45	561.74	5.45	- 26.2	2.2	+ 1.0	-25.2	- 6.1
5042	P <sup>1</sup>	June 7.....	55	.....	.....	.....	2.0	.....	.....	.....

OBSERVATIONS OF  $\beta$  CORONÆ BOREALIS—*Concluded.*

Plate	Observer*	Date	Exposure	Julian Day	Phase	Vel. (V)	Wt.	Correction for 3rd body	Vel. (V <sup>1</sup> )	O-C
		1912.	m.							
5049	C	June 13.....	40	2,419, 567.74	11.45	- 21.0	2.2	+ 0.9	-20.1	- 1.1
5050	C	June 13.....	70	.....	.....	.....	2.7	.....	.....	.....
5054	C	June 17.....	75	571.61	15.32	- 19.6	2.5	+ 0.8	-18.8	+ 0.7
5055	C-P <sup>1</sup>	June 17.....	75	.....	.....	.....	1.0	.....	.....	.....
5058	H-C	June 18.....	40	572.73	16.44	- 16.9	2.5	+ 0.7	-16.2	+ 3.4
5062	H	June 21.....	16	575.67	19.38	- 18.9	.7	+ 0.6	-18.3	+ 1.9
5064	C	June 24.....	68	578.68	22.39	- 19.6	2.0	+ 0.6	-19.0	+ 1.8
5069	H-C	June 25.....	44	579.70	23.41	- 22.4	1.2	+ 0.5	-21.9	- 0.9
5071	P	June 26.....	30	580.60	24.31	- 21.5	1.0	+ 0.5	-21.0	+ 0.2
5072	P	June 26.....	35	.....	.....	.....	1.7	.....	.....	.....
5086	H	July 2.....	40	586.66	30.37	- 21.6	1.7	+ 0.3	-21.3	+ 1.5
5087	H	July 2.....	40	.....	.....	.....	1.0	.....	.....	.....
5091	P <sup>1</sup>	July 3.....	50	587.67	31.38	- 20.2	2.0	+ 0.3	-19.9	+ 3.2
5092	P <sup>1</sup>	July 3.....	38	.....	.....	.....	2.2	.....	.....	.....
5111	P <sup>1</sup>	July 17.....	30	601.58	4.39	- 14.4	2.2	- 0.1	-14.5	+ 5.0
5112	P <sup>1</sup>	July 17.....	30	.....	.....	.....	1.2	.....	.....	.....
5121	H	July 23.....	35	607.61	10.42	- 14.1	2.7	- 0.3	-14.4	+ 4.5
5122	H	July 23.....	36	.....	.....	.....	1.5	.....	.....	.....

\*P=Plakett, H=Harper, P<sup>1</sup>=Parker, C=Cannon.

MEASURES OF  $\beta$  CORONÆ BOREALIS.

(Comparator Measures, Star Standard 4330).

Region	3220		3221		3302		3303		3384		3389		3413	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 27.16	$\frac{1}{2}$	- 30.18	$\frac{1}{2}$	.....		- 26.90	$\frac{1}{2}$	- 16.14	$\frac{1}{2}$	.....		- 5.25	$\frac{1}{2}$
8	23.86	$\frac{1}{2}$	27.00	$\frac{1}{2}$	.....		.....		22.70	$\frac{1}{2}$	.....		.....	
9	17.89	1	25.71	$\frac{1}{2}$	- 16.55	$\frac{1}{2}$	18.01	$\frac{1}{2}$	20.91	1	- 18.45	$\frac{1}{2}$	5.37	$\frac{1}{2}$
10	22.94	$\frac{1}{2}$	33.92	$\frac{1}{2}$	21.86	$\frac{1}{2}$	.....		16.69	$\frac{1}{2}$	13.46	$\frac{1}{2}$	15.08	$\frac{1}{2}$
11	19.24	$\frac{1}{2}$	19.76	$\frac{1}{2}$	24.23	$\frac{1}{2}$	14.35	$\frac{1}{2}$	- 14.87	$\frac{1}{2}$	6.76	$\frac{1}{2}$	8.11	$\frac{1}{2}$
12	30.73	$\frac{1}{2}$	32.23	$\frac{1}{2}$	.....		.....		.....		.....		.....	
14	- 20.25	$\frac{1}{2}$	- 26.66	$\frac{1}{2}$	- 22.11	$\frac{1}{2}$	- 20.44	$\frac{1}{2}$	.....		- 8.36	$\frac{1}{2}$	- 14.12	$\frac{1}{2}$
Weighted mean	- 21.39		- 27.76		- 21.10		- 18.93		- 17.44		- 11.51		- 9.43	
$V_a$	+ 18.67		+ 18.67		+ 15.84		+ 15.84		+ 6.07		+ 5.72		+ 0.53	
$V_d$	- .02		- .02		- .09		- .10		$\pm$ .00		- .11		- .08	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 21.3		- 27.7		- 23.9		- 21.8		- 30.0		- 24.5		- 27.6	



MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	3414		3421		3460		3482		3486		3502		3514	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 12.46	$\frac{1}{2}$	+ 3.67	$\frac{1}{2}$	- 7.97	$\frac{1}{2}$	+ 22.57	$\frac{1}{2}$	+ 16.14	$\frac{1}{2}$	+ 16.79	$\frac{1}{2}$	+ 12.86	$\frac{1}{2}$
8	2.91	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	16.88	$\frac{1}{2}$	12.86	$\frac{1}{2}$	12.86	$\frac{1}{2}$
9	12.86	$\frac{1}{2}$	3.58	$\frac{1}{2}$	+ 7.71	$\frac{1}{2}$	16.21	$\frac{1}{2}$	10.96	$\frac{1}{2}$	5.92	$\frac{1}{2}$	7.22	$\frac{1}{2}$
10	12.71	$\frac{1}{2}$	5.60	$\frac{1}{2}$	.....	.....	.....	.....	11.63	$\frac{1}{2}$	12.48	$\frac{1}{2}$	5.51	$\frac{1}{2}$
11	10.92	$\frac{1}{2}$	+ 1.56	$\frac{1}{2}$	.....	.....	+ 17.16	$\frac{1}{2}$	10.40	$\frac{1}{2}$	.....	.....	.....	.....
12	5.51	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14	- 7.43	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	+ 10.03	$\frac{1}{2}$	8.18	$\frac{1}{2}$	+ 11.61	$\frac{1}{2}$
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	+ 9.88	$\frac{1}{2}$	.....	.....
Weighted mean	- 10.13		+ 3.60		+ 2.51		+ 17.86		+ 12.30		+ 10.56		+ 10.00	
V <sub>a</sub>	+ 0.53		- 14.42		- 9.50		- 14.42		- 15.34		- 17.38		- 18.63	
V <sub>s</sub>	- .10		- .22		- .23		- .22		- .12		- .23		- .20	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 28.3		- 29.6		- 25.8		- 15.4		- 21.8		- 25.7		- 27.4	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	3595		3628		3629		4027		4028		4065		4075	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4														
5	+ 20.60	$\frac{1}{2}$	+ 14.83	$\frac{1}{2}$	+ 15.74	$\frac{1}{2}$			- 14.43	$\frac{1}{2}$				
8														
9	17.33	$\frac{1}{2}$	22.02	1	18.78	1	- 32.42	$\frac{1}{2}$	20.12	1	- 15.99	$\frac{1}{2}$	28.51	1
10	19.39	$\frac{1}{2}$	17.77	$\frac{1}{2}$	15.62	$\frac{1}{2}$			26.06	$\frac{1}{2}$	20.46	$\frac{1}{2}$	28.00	1
11	11.75	$\frac{1}{2}$	15.08	$\frac{1}{2}$	15.08	$\frac{1}{2}$			19.24	$\frac{1}{2}$	24.44	$\frac{1}{2}$	24.75	1
12	+ 15.32	$\frac{1}{2}$	14.31	$\frac{1}{2}$					28.73	$\frac{1}{2}$	27.03	$\frac{1}{2}$	27.83	$\frac{1}{2}$
13														
14			+ 17.37	$\frac{1}{2}$	15.79	$\frac{1}{2}$			20.90	$\frac{1}{2}$	- 17.65	$\frac{1}{2}$	27.87	1
15					+ 9.70	$\frac{1}{2}$			- 23.17	$\frac{1}{2}$			- 31.43	$\frac{1}{2}$
Weighted mean	+ 16.61		+ 18.21		+ 16.13		- 32.42		- 21.60		- 20.81		- 27.95	
$V_s$	- 19.32		- 15.81		- 15.81		+ 18.01		+ 18.01		+ 16.59		+ 16.36	
$V_s$	- .23		- .19		- .20		+ .07		+ .07		- .07		$\pm$ .00	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 21.5		- 16.4		- 18.5		- 33.2		- 22.1		- 22.9		- 30.2	

MEASURES OF  $\beta$  CORONÆ BOREALIS—*Continued.*

(Comparator Measures, Star Standard 4330).

Region	4084		4085		4097		4109		4110		4127		4149	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4	- 26.71	$\frac{1}{2}$	- 14.38	$\frac{1}{2}$	- 23.70	$\frac{1}{2}$	+ 5.48	$\frac{1}{2}$	- 6.58	$\frac{1}{2}$	- 17.12	$\frac{1}{2}$	.....	.....
5	27.81	$\frac{1}{2}$	.....	.....	15.48	$\frac{1}{2}$	- 3.84	$\frac{1}{2}$	.....	.....	.....	.....	- 13.78	$\frac{1}{2}$
6	.....	.....	.....	.....	.....	.....	.....	.....	7.18	$\frac{1}{2}$	.....	.....	.....	.....
8	21.88	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	3.72	$\frac{1}{2}$	11.41	$\frac{1}{2}$	.....	.....
9	12.63	$\frac{1}{2}$	- 29.63	$\frac{1}{2}$	15.65	1	- 4.81	1	19.01	$\frac{1}{2}$	8.61	1	11.18	$\frac{1}{2}$
10	26.06	$\frac{1}{2}$	.....	.....	23.69	1	- 1.29	$\frac{1}{2}$	5.17	1	13.79	$\frac{1}{2}$	10.77	$\frac{1}{2}$
11	- 23.40	$\frac{1}{2}$	.....	.....	18.72	$\frac{1}{2}$	+ 3.12	$\frac{1}{2}$	- 8.01	$\frac{1}{2}$	14.56	1	10.92	$\frac{1}{2}$
12	.....	.....	.....	.....	21.32	$\frac{1}{2}$	- 6.21	$\frac{1}{2}$	.....	.....	15.52	$\frac{1}{2}$	17.52	$\frac{1}{2}$
14	.....	.....	.....	.....	22.11	$\frac{1}{2}$	- 9.94	$\frac{1}{2}$	.....	.....	11.89	$\frac{1}{2}$	8.36	$\frac{1}{2}$
15	.....	.....	.....	.....	- 20.65	$\frac{1}{2}$	.....	.....	.....	.....	- 15.71	$\frac{1}{2}$	- 13.65	$\frac{1}{2}$
Weighted mean	- 22.28		- 24.55		- 20.17		- 1.95		- 7.88		- 13.06		- 12.19	
$V_s$	+ 16.15		+ 16.15		+ 15.65		+ 14.91		+ 14.91		+ 14.13		+ 10.68	
$V_s$	+ .07		+ .07		- .09		- .07		- .07		- .11		- .11	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 24.7		- 26.9		- 23.2		- 5.7		- 11.6		- 17.6		- 20.1	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4150		4160		4161		4166		4167		4184		4192	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4	- 21.23	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	- 13.51	$\frac{1}{2}$	- 11.41	$\frac{1}{2}$	- 15.74	$\frac{1}{2}$	- 10.50	$\frac{1}{2}$	.....	.....	- 14.43	$\frac{1}{2}$
8	.....	.....	8.73	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	13.74	$\frac{1}{2}$
9	20.35	1	5.93	$\frac{1}{2}$	5.37	1	11.51	1	10.62	$\frac{1}{2}$	- 5.37	$\frac{1}{2}$	15.88	$\frac{1}{2}$
10	11.31	$\frac{1}{2}$	14.86	1	5.92	$\frac{1}{2}$	19.39	$\frac{1}{2}$	12.92	$\frac{1}{2}$	8.64	$\frac{1}{2}$	15.08	$\frac{1}{2}$
11	17.37	$\frac{1}{2}$	10.71	1	10.19	$\frac{1}{2}$	9.36	$\frac{1}{2}$	- 10.92	$\frac{1}{2}$	9.67	$\frac{1}{2}$	16.64	1
12	16.02	$\frac{1}{2}$	11.31	$\frac{1}{2}$	15.71	$\frac{1}{2}$	19.92	$\frac{1}{2}$	.....	.....	7.37	$\frac{1}{2}$	16.82	$\frac{1}{2}$
14	8.83	$\frac{1}{2}$	9.29	$\frac{1}{2}$	12.54	$\frac{1}{2}$	16.54	$\frac{1}{2}$	.....	.....	5.11	$\frac{1}{2}$	14.40	$\frac{1}{2}$
15	- 16.79	$\frac{1}{2}$	- 9.70	$\frac{1}{2}$	- 19.04	$\frac{1}{2}$	- 17.60	$\frac{1}{2}$	.....	.....	- 10.33	$\frac{1}{2}$	- 9.70	$\frac{1}{2}$
Weighted mean	- 16.75		- 11.10		- 10.69		- 15.03		- 11.24		- 9.29		- 15.20	
V <sub>a</sub>	+ 10.68		+ 9.10		+ 9.10		+ 8.80		+ 8.80		+ 6.46		+ 6.15	
V <sub>s</sub>	- .11		- .11		- .11		- .04		- .04		- .16		- .05	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 24.8		- 20.7		- 20.3		- 24.9		- 21.1		- 21.6		- 27.7	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4193		4199		4209		4209*		4210		4224		4237	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 17.06	$\frac{1}{2}$	- 12.07	$\frac{1}{2}$	- 17.06	$\frac{1}{2}$	- 7.61	$\frac{1}{2}$	- 17.71	$\frac{1}{2}$	- 7.61	$\frac{1}{2}$	- 13.78	$\frac{1}{2}$
8	8.73	$\frac{1}{2}$	12.80	$\frac{1}{2}$	.....		.....		13.04	$\frac{1}{2}$	.....		.....	
9	10.96	$\frac{1}{2}$	9.28	$\frac{1}{2}$	14.53	1	12.86	1	12.30	$\frac{1}{2}$	5.25	1	8.94	1
10	9.91	$\frac{1}{2}$	9.15	$\frac{1}{2}$	14.00	$\frac{1}{2}$	12.17	$\frac{1}{2}$	13.46	$\frac{1}{2}$	10.02	$\frac{1}{2}$	10.02	$\frac{1}{2}$
11	10.92	$\frac{1}{2}$	11.96	1	11.44	$\frac{1}{2}$	4.99	$\frac{1}{2}$	11.44	$\frac{1}{2}$	2.08	$\frac{1}{2}$	7.80	$\frac{1}{2}$
12	8.01	$\frac{1}{2}$	.....		12.01	$\frac{1}{2}$	12.21	$\frac{1}{2}$	7.51	$\frac{1}{2}$	.....		.....	
14	13.75	$\frac{1}{2}$	12.36	$\frac{1}{2}$	19.51	$\frac{1}{2}$	12.08	$\frac{1}{2}$	11.43	$\frac{1}{2}$	12.73	$\frac{1}{2}$	8.36	$\frac{1}{2}$
15	- 15.09	$\frac{1}{2}$	- 13.29	$\frac{1}{2}$	- 12.57	$\frac{1}{2}$	- 14.37	$\frac{1}{2}$	- 10.33	$\frac{1}{2}$	- 8.26	$\frac{1}{2}$	- 11.04	$\frac{1}{2}$
Weighted mean	- 12.00		- 11.53		- 14.45		- 11.14		- 11.66		- 7.31		- 9.54	
V <sub>a</sub>	+ 6.15		+ 4.11		+ 3.73		+ 3.73		+ 3.73		+ 3.06		+ 2.37	
V <sub>s</sub>	- .05		+ .04		- .15		- .15		- .15		- .04		± .00	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 24.5		- 26.0		- 29.5		- 26.2		- 26.7		- 22.9		- 25.8	

\*Check measurement.

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4243		4244		4261		4262		4269		4268		4276	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 10.23	$\frac{1}{2}$	- 8.79	$\frac{1}{2}$	- 7.22	$\frac{1}{2}$	- 11.41	$\frac{1}{2}$	+ 4.69	$\frac{1}{2}$	+ 10.76	$\frac{1}{2}$	- 7.48	$\frac{1}{2}$
8	6.17	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	2.10	$\frac{1}{2}$	- 4.47	$\frac{1}{2}$
9	15.88	$\frac{1}{2}$	15.32	$\frac{1}{2}$	5.93	$\frac{1}{2}$	12.86	$\frac{1}{2}$	+ 0.56	1	3.69	1	- 7.00	$\frac{1}{2}$
10	9.91	$\frac{1}{2}$	9.15	$\frac{1}{2}$	9.91	$\frac{1}{2}$	8.08	$\frac{1}{2}$	+ 1.61	$\frac{1}{2}$	5.38	$\frac{1}{2}$	+ 2.49	$\frac{1}{2}$
11	10.40	$\frac{1}{2}$	6.76	$\frac{1}{2}$	10.92	$\frac{1}{2}$	12.69	$\frac{1}{2}$	+ 3.12	$\frac{1}{2}$	1.87	$\frac{1}{2}$	.....	.....
12	10.01	$\frac{1}{2}$	13.31	$\frac{1}{2}$	7.31	$\frac{1}{2}$	14.01	$\frac{1}{2}$	- 6.51	$\frac{1}{2}$	2.30	$\frac{1}{2}$	.....	.....
14	14.86	$\frac{1}{2}$	15.33	$\frac{1}{2}$	8.08	$\frac{1}{2}$	9.29	$\frac{1}{2}$	- 2.14	$\frac{1}{2}$	0.93	$\frac{1}{2}$	- 4.64	$\frac{1}{2}$
15	- 11.61	$\frac{1}{2}$	- 11.04	$\frac{1}{2}$	- 7.00	$\frac{1}{2}$	- 10.60	$\frac{1}{2}$	.....	.....	+ 5.66	$\frac{1}{2}$	.....	.....
Weighted mean	- 11.55		- 11.44		- 8.05		- 11.10		+ 0.71		+ 3.46		- 3.92	
$V_a$	+ 2.02		+ 2.02		+ 1.30		+ 1.30		+ 0.95		+ 0.95		+ 0.28	
$V_s$	$\pm$ .00		$\pm$ .00		- .13		- .13		$\pm$ 0.00		- .11		+ .04	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 28.1		- 28.0		- 25.5		- 28.5		- 16.9		- 14.3		- 22.2	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4277		4289		4290		4297		4298		4313		4314	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 8.13	$\frac{1}{2}$	- 9.18	$\frac{1}{2}$	+ 1.31	$\frac{1}{2}$	- 1.31	$\frac{1}{2}$	- 3.94	$\frac{1}{2}$	+ 13.78	$\frac{1}{2}$	+ 7.22	$\frac{1}{2}$
8	.....	.....	.....	.....	.....	.....	.....	.....	+ 2.09	$\frac{1}{2}$	0.58	$\frac{1}{2}$	1.45	1
9	6.71	$\frac{1}{2}$	6.15	$\frac{1}{2}$	+ 1.68	$\frac{1}{2}$	+ 2.01	1	+ 0.89	1	5.59	1	1.40	$\frac{1}{2}$
10	6.46	$\frac{1}{2}$	6.78	$\frac{1}{2}$	- 2.37	$\frac{1}{2}$	+ 0.54	$\frac{1}{2}$	+ 2.69	$\frac{1}{2}$	4.31	$\frac{1}{2}$	7.80	$\frac{1}{2}$
11	4.47	$\frac{1}{2}$	4.99	$\frac{1}{2}$	+ 4.68	$\frac{1}{2}$	+ 1.04	$\frac{1}{2}$	- 3.43	$\frac{1}{2}$	9.05	1	2.00	$\frac{1}{2}$
12	.....	.....	.....	.....	- 1.50	$\frac{1}{2}$	- 2.80	$\frac{1}{2}$	+ 1.80	$\frac{1}{2}$	7.81	$\frac{1}{2}$	.....	.....
14	5.39	$\frac{1}{2}$	3.25	1	+ 2.32	$\frac{1}{2}$	+ 0.74	$\frac{1}{2}$	- 1.86	$\frac{1}{2}$	5.39	$\frac{1}{2}$	5.11	$\frac{1}{2}$
15	- 9.16	$\frac{1}{2}$	- 8.71	$\frac{1}{2}$	+ 1.17	$\frac{1}{2}$	- 3.77	$\frac{1}{2}$	- 2.51	$\frac{1}{2}$	+ 5.84	$\frac{1}{2}$	+ 0.90	$\frac{1}{2}$
Weighted mean	- 6.59		- 5.97		+ 1.24		- 0.02		- 0.40		+ 6.97		+ 3.41	
$V_a$	+ 0.28		- 1.77		- 1.77		- 2.17		- 2.17		- 6.90		- 6.90	
$V_d$	+ .04		- .02		- .02		- .05		- .07		- .16		- .16	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 24.9		- 26.4		- 19.1		- 20.8		- 21.2		- 18.7		- 22.2	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.  
(Comparator Measures, Star Standard 4330).

Region	4316		4317		4321		4322		4334		4335		4339	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 4.33	$\frac{1}{2}$	.....	.....	- 12.46	$\frac{1}{2}$	+ 9.84	$\frac{1}{2}$	+ 4.59	$\frac{1}{2}$	+ 3.02	$\frac{1}{2}$	+ 1.97	$\frac{1}{2}$
8	.....	.....	.....	.....	.....	.....	.....	.....	6.40	$\frac{1}{2}$	.....	.....	.....	.....
9	6.71	$\frac{1}{2}$	- 3.91	$\frac{1}{2}$	5.03	$\frac{1}{2}$	8.94	$\frac{1}{2}$	8.38	$\frac{1}{2}$	2.57	$\frac{1}{2}$	+ 4.81	1
10	4.31	$\frac{1}{2}$	- 3.23	$\frac{1}{2}$	9.69	$\frac{1}{2}$	6.14	$\frac{1}{2}$	4.85	$\frac{1}{2}$	3.98	$\frac{1}{2}$	+ 5.71	$\frac{1}{2}$
11	9.05	$\frac{1}{2}$	- 0.31	$\frac{1}{2}$	0.52	$\frac{1}{2}$	8.11	$\frac{1}{2}$	6.97	1	5.41	$\frac{1}{2}$	+ 2.60	$\frac{1}{2}$
12	0.30	$\frac{1}{2}$	+ 0.70	$\frac{1}{2}$	6.51	$\frac{1}{2}$	7.01	$\frac{1}{2}$	4.00	$\frac{1}{2}$	.....	.....	+ 4.30	$\frac{1}{2}$
14	+ 8.64	$\frac{1}{2}$	+ 2.60	$\frac{1}{2}$	6.04	$\frac{1}{2}$	4.92	$\frac{1}{2}$	4.64	$\frac{1}{2}$	+ 4.64	$\frac{1}{2}$	- 0.19	$\frac{1}{2}$
15	.....	.....	- 2.69	$\frac{1}{2}$	- 11.67	$\frac{1}{2}$	+ 2.96	$\frac{1}{2}$	+ 4.94	$\frac{1}{2}$	.....	.....	+ 4.04	$\frac{1}{2}$
Weighted mean	+ 6.41		- 1.30		- 6.65		+ 6.59		+ 5.97		+ 3.94		+ 3.57	
$V_a$	- 7.55		- 7.55		- 8.77		- 8.77		- 10.02		- 10.02		- 10.31	
$V_d$	- .18		- .19		+ .04		+ .02		- .14		- .14		- .14	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 19.9		- 27.6		- 34.0		- 20.8		- 22.8		- 24.8		- 25.5	



MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4340		4345		4346		4353		4363		4364		4369	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 10.10	$\frac{1}{2}$	+ 15.74	$\frac{1}{2}$	+ 9.84	$\frac{1}{2}$	+ 5.25	$\frac{1}{2}$	+ 23.22	$\frac{1}{2}$	+ 26.50	$\frac{1}{2}$	+ 28.47	$\frac{1}{2}$
9	4.47	1	8.05	$\frac{1}{2}$	10.96	$\frac{1}{2}$	11.40	$\frac{1}{2}$	13.98	1	18.11	$\frac{1}{2}$	22.70	1
10	3.23	$\frac{1}{2}$	8.08	$\frac{1}{2}$	10.77	$\frac{1}{2}$	11.85	$\frac{1}{2}$	11.31	$\frac{1}{2}$	19.92	$\frac{1}{2}$	21.88	$\frac{1}{2}$
11	4.47	$\frac{1}{2}$	6.76	$\frac{1}{2}$	9.15	$\frac{1}{2}$	10.92	$\frac{1}{2}$	14.04	$\frac{1}{2}$	16.43	$\frac{1}{2}$	24.75	$\frac{1}{2}$
12	5.70	$\frac{1}{2}$	4.80	$\frac{1}{2}$	.....	.....	13.01	$\frac{1}{2}$	9.81	$\frac{1}{2}$	14.71	$\frac{1}{2}$	14.31	$\frac{1}{2}$
14	9.29	$\frac{1}{2}$	+ 5.85	$\frac{1}{2}$	10.87	$\frac{1}{2}$	.....	.....	10.96	$\frac{1}{2}$	+ 12.54	$\frac{1}{2}$	19.51	$\frac{1}{2}$
15	+ 4.94	$\frac{1}{2}$	.....	.....	+ 6.74	$\frac{1}{2}$	+ 8.98	$\frac{1}{2}$	+ 12.84	$\frac{1}{2}$	.....	.....	+ 12.39	$\frac{1}{2}$
Weighted mean	+ 5.59		+ 7.80		+ 9.71		+ 10.57		+ 14.17		+ 17.53		+ 21.41	
$V_s$	- 10.31		- 10.89		- 10.89		- 11.18		- 13.08		- 13.08		- 14.84	
$V_d$	- .15		- .09		- .10		- .09		$\pm$ .00		$\pm$ .00		- .19	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 23.5		- 21.8		- 19.9		- 19.3		- 17.5		- 14.1		- 12.2	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4370		4375		4376		4379		4380		4383		4384	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 14.43	$\frac{1}{2}$	+ 24.93	$\frac{1}{2}$	+ 19.68	$\frac{1}{2}$	+ 16.40	$\frac{1}{2}$	+ 21.25	$\frac{1}{2}$	+ 19.94	$\frac{1}{2}$	+ 5.64	$\frac{1}{2}$
9	20.68	1	18.45	1	10.40	$\frac{1}{2}$	15.65	1	17.33	1	18.45	1	16.43	$\frac{1}{2}$
10	15.40	$\frac{1}{2}$	12.39	$\frac{1}{2}$	16.37	$\frac{1}{2}$	12.92	$\frac{1}{2}$	12.71	$\frac{1}{2}$	16.69	$\frac{1}{2}$	14.54	$\frac{1}{2}$
11	15.08	$\frac{1}{2}$	15.60	$\frac{1}{2}$	13.21	$\frac{1}{2}$	13.73	$\frac{1}{2}$	14.87	$\frac{1}{2}$	16.64	$\frac{1}{2}$	14.87	$\frac{1}{2}$
12	15.72	$\frac{1}{2}$	14.51	$\frac{1}{2}$	19.52	$\frac{1}{2}$	.....	.....	.....	.....	20.22	$\frac{1}{2}$	13.01	$\frac{1}{2}$
14	+ 13.75	$\frac{1}{2}$	13.94	$\frac{1}{2}$	+ 11.89	$\frac{1}{2}$	17.19	$\frac{1}{2}$	15.98	$\frac{1}{2}$	+ 14.21	$\frac{1}{2}$	9.75	$\frac{1}{2}$
15	.....	.....	+ 17.51	$\frac{1}{2}$	.....	.....	+ 12.57	$\frac{1}{2}$	+ 10.60	$\frac{1}{2}$	.....	.....	+ 5.66	$\frac{1}{2}$
Weighted mean	+ 16.78		+ 16.58		+ 14.29		+ 14.93		+ 15.69		+ 17.92		+ 11.76	
V <sub>0</sub>	- 14.84		- 15.72		- 15.72		- 16.14		- 16.14		- 16.36		- 16.36	
V <sub>s</sub>	- .20		- .04		- .04		- .04		- .05		- .09		- .11	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 16.9		- 17.8		- 20.1		- 19.8		- 19.1		- 17.1		- 23.3	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4392		4393		4394		4395		4402		4403		4406	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 20.73	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	+ 12.46	$\frac{1}{2}$	+ 23.35	$\frac{1}{2}$	+ 23.09	$\frac{1}{2}$
8	.....	.....	.....	.....	.....	.....	.....	.....	21.53	$\frac{1}{2}$	12.30	$\frac{1}{2}$	27.00	$\frac{1}{2}$
9	26.27	1	+ 19.56	$\frac{1}{2}$	+ 14.31	$\frac{1}{2}$	+ 19.23	$\frac{1}{2}$	16.43	$\frac{1}{2}$	16.48	$\frac{1}{2}$	24.82	1
10	23.37	$\frac{1}{2}$	.....	.....	8.62	$\frac{1}{2}$	17.23	$\frac{1}{2}$	20.46	$\frac{1}{2}$	16.43	$\frac{1}{2}$	28.00	$\frac{1}{2}$
11	19.03	$\frac{1}{2}$	.....	.....	9.67	$\frac{1}{2}$	14.35	$\frac{1}{2}$	18.93	$\frac{1}{2}$	16.42	$\frac{1}{2}$	28.81	$\frac{1}{2}$
12	13.51	$\frac{1}{2}$	.....	.....	.....	.....	15.01	$\frac{1}{2}$	16.32	$\frac{1}{2}$	.....	.....	23.52	$\frac{1}{2}$
14	+ 18.86	$\frac{1}{2}$	.....	.....	12.26	$\frac{1}{2}$	15.33	$\frac{1}{2}$	+ 22.02	$\frac{1}{2}$	+ 13.94	$\frac{1}{2}$	+ 23.23	$\frac{1}{2}$
15	.....	.....	.....	.....	+ 4.49	$\frac{1}{2}$	+ 12.57	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....
Weighted mean	+ 22.09		+ 19.56		+ 10.47		+ 15.98		+ 18.20		+ 15.82		+ 25.42	
$V_s$	- 17.31		- 17.31		- 17.48		- 17.48		- 17.67		- 17.67		- 18.14	
$V_d$	- .09		- .09		$\pm$ .00		$\pm$ .00		- .15		- .15		- .11	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 13.9		- 16.4		- 25.6		- 20.1		- 18.2		- 20.6		- 11.4	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4407		4414		4424		4432		4433		4434		4439	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 16.79	$\frac{1}{2}$	+ 29.52	$\frac{1}{2}$	+ 20.60	$\frac{1}{2}$	+ 28.60	$\frac{1}{2}$	+ 14.43	$\frac{1}{2}$	+ 17.06	$\frac{1}{2}$	+ 25.98	$\frac{1}{2}$
8	25.03	$\frac{1}{2}$	13.74	$\frac{1}{2}$	.....	.....	.....	.....	8.50	$\frac{1}{2}$	.....	.....	20.95	$\frac{1}{2}$
9	15.99	$\frac{1}{2}$	21.80	$\frac{1}{2}$	23.48	$\frac{1}{2}$	27.06	1	13.97	1	22.12	$\frac{1}{2}$	23.81	1
10	20.14	$\frac{1}{2}$	19.17	$\frac{1}{2}$	23.91	$\frac{1}{2}$	25.85	$\frac{1}{2}$	13.25	$\frac{1}{2}$	19.90	$\frac{1}{2}$	19.92	$\frac{1}{2}$
11	28.08	$\frac{1}{2}$	14.04	$\frac{1}{2}$	22.15	$\frac{1}{2}$	26.00	$\frac{1}{2}$	15.60	$\frac{1}{2}$	16.69	$\frac{1}{2}$	23.40	$\frac{1}{2}$
12	.....	.....	+ 19.32	$\frac{1}{2}$	26.03	$\frac{1}{2}$	+ 29.73	$\frac{1}{2}$	14.80	$\frac{1}{2}$	21.84	$\frac{1}{2}$	22.82	$\frac{1}{2}$
14	+ 24.43	$\frac{1}{2}$	.....	.....	+ 18.58	$\frac{1}{2}$	.....	.....	16.54	$\frac{1}{2}$	24.00	$\frac{1}{2}$	22.76	$\frac{1}{2}$
15	.....	.....	.....	.....	.....	.....	.....	.....	+ 12.54	$\frac{1}{2}$	+ 19.32	$\frac{1}{2}$	+ 24.25	$\frac{1}{2}$
Weighted 'mean	+ 21.63		+ 19.18		+ 22.63		+ 27.03		+ 14.04		+ 20.07		+ 22.96	
$V_a$	- 18.14		- 18.58		- 19.31		- 19.52		- 19.86		- 19.86		- 19.29	
$V_s$	- .11		- .06		- .02		$\pm$ .00		- .06		- .07		- .09	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 15.2		- 18.1		- 15.3		- 11.1		- 24.5		- 18.5		- 15.0	

MEASURES OF  $\beta$  CORONÆ BOREALIS—*Continued.*

(Comparator Measures, Star Standard 4330).

Region	4442		4443		4449		4450		4486		4487		4898	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 19.02	$\frac{1}{2}$	+ 20.07	$\frac{1}{2}$	+ 22.04	$\frac{1}{2}$	+ 26.90	$\frac{1}{2}$	+ 22.96	$\frac{1}{2}$	+ 18.37	$\frac{1}{2}$	- 15.74	$\frac{1}{2}$
6	.....	.....	14.86	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	19.21	$\frac{1}{2}$	18.86	$\frac{1}{2}$	22.35	$\frac{1}{2}$	19.56	$\frac{1}{2}$	20.95	$\frac{1}{2}$	13.15	$\frac{1}{2}$	.....	.....
9	15.09	1	20.68	1	20.12	1	19.01	1	16.77	$\frac{1}{2}$	23.48	$\frac{1}{2}$	8.16	1
10	18.85	$\frac{1}{2}$	21.00	$\frac{1}{2}$	19.92	$\frac{1}{2}$	25.63	$\frac{1}{2}$	22.08	$\frac{1}{2}$	18.85	$\frac{1}{2}$	11.63	$\frac{1}{2}$
11	17.68	$\frac{1}{2}$	18.20	$\frac{1}{2}$	22.36	$\frac{1}{2}$	24.75	$\frac{1}{2}$	15.81	$\frac{1}{2}$	16.95	$\frac{1}{2}$	11.44	$\frac{1}{2}$
12	12.51	$\frac{1}{2}$	17.32	$\frac{1}{2}$	22.52	$\frac{1}{2}$	23.72	$\frac{1}{2}$	16.02	$\frac{1}{2}$	16.12	$\frac{1}{2}$	.....	.....
14	15.33	$\frac{1}{2}$	18.12	$\frac{1}{2}$	21.37	$\frac{1}{2}$	20.44	$\frac{1}{2}$	.....	.....	14.86	$\frac{1}{2}$	17.65	$\frac{1}{2}$
15	+ 16.79	$\frac{1}{2}$	+ 17.51	$\frac{1}{2}$	+ 17.78	$\frac{1}{2}$	+ 17.78	$\frac{1}{2}$	+ 20.38	$\frac{1}{2}$	+ 18.41	$\frac{1}{2}$	- 18.41	$\frac{1}{2}$
Weighted mean	+ 16.56		+ 19.06		+ 20.89		+ 21.27		+ 21.18		+ 18.14		- 12.46	
$V_a$	- 20.07		- 20.07		- 20.21		- 20.21		- 19.78		- 19.78		+ 13.39	
$V_s$	- .07		- .07		- .11		- .12		- .14		- .15		- .06	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 22.2		- 19.7		- 18.0		- 17.7		- 17.3		- 20.4		- 17.6	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4899		4911		4912		4919		4920		4927		4928	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	- 7.61	$\frac{1}{2}$	- 23.35	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	14.53	$\frac{1}{2}$	26.27	1	- 22.92	1	- 19.34	1	- 17.11	$\frac{1}{2}$	- 10.06	$\frac{1}{2}$	- 10.96	1
10	.....	.....	27.46	$\frac{1}{2}$	27.25	$\frac{1}{2}$	15.94	$\frac{1}{2}$	13.25	$\frac{1}{2}$	15.29	$\frac{1}{2}$	8.94	$\frac{1}{2}$
11	18.30	$\frac{1}{2}$	24.75	$\frac{1}{2}$	30.36	$\frac{1}{2}$	17.16	$\frac{1}{2}$	8.11	$\frac{1}{2}$	16.12	$\frac{1}{2}$	8.63	$\frac{1}{2}$
12	- 15.01	$\frac{1}{2}$	26.03	$\frac{1}{2}$	22.32	$\frac{1}{2}$	18.32	$\frac{1}{2}$	20.82	$\frac{1}{2}$	17.82	$\frac{1}{2}$	10.31	$\frac{1}{2}$
14	.....	.....	- 22.95	$\frac{1}{2}$	19.97	$\frac{1}{2}$	- 18.12	$\frac{1}{2}$	15.14	$\frac{1}{2}$	- 10.03	$\frac{1}{2}$	14.58	$\frac{1}{2}$
15	.....	.....	.....	.....	- 22.27	$\frac{1}{2}$	.....	.....	- 13.29	$\frac{1}{2}$	.....	.....	- 9.70	$\frac{1}{2}$
Weighted mean	- 14.69		- 25.23		- 23.87		- 18.24		- 14.11		- 13.64		- 10.71	
$V_a$	+ 13.39		+ 12.27		+ 12.27		+ 11.38		+ 11.38		+ 10.14		+ 10.14	
$V_d$	- .06		+ .06		+ .02		+ .04		+ .02		- .04		- .05	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 20.0		- 31.5		- 30.2		- 25.4		- 21.3		- 22.1		- 19.2	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4931		4932		4937		4938		4950		4951		4956	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5					17.97	$\frac{1}{2}$								
9	- 18.45	$\frac{1}{2}$	- 16.55	$\frac{1}{2}$	17.89	1	- 14.31	$\frac{1}{2}$	- 13.97	$\frac{1}{2}$	- 10.62	$\frac{1}{2}$	- 12.86	$\frac{1}{2}$
10	18.52	$\frac{1}{2}$	18.52	$\frac{1}{2}$	16.69	$\frac{1}{2}$			24.55	$\frac{1}{2}$	14.32	$\frac{1}{2}$	15.29	$\frac{1}{2}$
11	18.93	$\frac{1}{2}$	18.93	$\frac{1}{2}$	16.64	$\frac{1}{2}$	13.79	$\frac{1}{2}$	17.16	$\frac{1}{2}$	11.96	$\frac{1}{2}$	9.88	$\frac{1}{2}$
12	19.22	$\frac{1}{2}$	15.71	$\frac{1}{2}$	20.22	$\frac{1}{2}$	- 14.87	$\frac{1}{2}$	15.52	$\frac{1}{2}$	15.21	$\frac{1}{2}$	10.51	$\frac{1}{2}$
14	- 20.16	$\frac{1}{2}$	- 19.32	$\frac{1}{2}$	- 16.26	$\frac{1}{2}$			13.47	$\frac{1}{2}$	- 19.97	$\frac{1}{2}$	- 6.97	$\frac{1}{2}$
15									- 12.57	$\frac{1}{2}$				
Weighted mean	- 18.95		- 17.76		- 17.60		- 14.32		- 15.76		- 14.32		- 10.65	
$V_s$	+ 9.56		+ 9.56		+ 8.56		+ 8.56		+ 5.89		+ 5.89		+ 5.56	
$V_s$	+ .09		+ .05		$\pm$ .00		- .04		- .04		- .07		$\pm$ .00	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 27.9		- 25.7		- 27.6		- 24.4		- 28.5		- 27.1		- 23.7	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4957		4961		4969		4973		4974		4980		4981	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	.....	.....	.....	.....	4.59	$\frac{1}{2}$	11.15	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....
9	- 9.50	$\frac{1}{2}$	- 7.49	1	19.01	1	15.65	$\frac{1}{2}$	- 16.99	$\frac{1}{2}$	- 3.58	$\frac{1}{2}$	+ 5.59	$\frac{1}{2}$
10	14.22	$\frac{1}{2}$	10.55	$\frac{1}{2}$	10.77	$\frac{1}{2}$	12.17	$\frac{1}{2}$	16.91	$\frac{1}{2}$	5.17	$\frac{1}{2}$	- 12.92	$\frac{1}{2}$
11	6.76	$\frac{1}{2}$	9.05	$\frac{1}{2}$	7.80	$\frac{1}{2}$	- 14.04	$\frac{1}{2}$	10.40	$\frac{1}{2}$	6.76	$\frac{1}{2}$	$\pm$ 0.00	$\frac{1}{2}$
12	13.51	$\frac{1}{2}$	3.73	$\frac{1}{2}$	14.71	$\frac{1}{2}$	.....	.....	.....	.....	3.50	$\frac{1}{2}$	- 10.81	$\frac{1}{2}$
14	11.89	$\frac{1}{2}$	9.57	$\frac{1}{2}$	- 15.33	$\frac{1}{2}$	.....	.....	15.05	$\frac{1}{2}$	7.90	$\frac{1}{2}$	- 6.32	$\frac{1}{2}$
15	- 11.22	$\frac{1}{2}$	- 6.02	$\frac{1}{2}$	.....	.....	.....	.....	- 14.58	$\frac{1}{2}$	- 13.47	$\frac{1}{2}$	.....	.....
Weighted mean	- 10.58		- 7.42		- 12.70		- 13.78		- 14.48		- 6.34		- 2.10	
V <sub>a</sub>	+ 5.65		+ 4.16		+ 3.15		+ 2.81		+ 2.81		+ 1.75		+ 1.75	
V <sub>d</sub>	- .04		- .16		$\pm$ .00		+ .06		+ .04		- .02		- .04	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 23.6		- 22.0		- 28.1		- 29.5		- 30.2		- 23.2		- 19.0	



MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	4984		4985		4988		4990		4991		4996		4997	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	.....	.....	± 0.00	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	+ 16.01	$\frac{1}{2}$	.....	.....
9	+ 2.79	$\frac{1}{2}$	- 0.81	$\frac{1}{2}$	- 8.05	$\frac{1}{2}$	+ 7.60	$\frac{1}{2}$	+ 10.29	$\frac{1}{2}$	+ 8.05	$\frac{1}{2}$	- 2.80	$\frac{1}{2}$
10	+ 0.54	$\frac{1}{2}$	- 0.54	$\frac{1}{2}$	.....	.....	- 0.86	$\frac{1}{2}$	+ 7.22	$\frac{1}{2}$	+ 4.31	$\frac{1}{2}$	6.68	$\frac{1}{2}$
11	+ 1.87	$\frac{1}{2}$	± 0.00	$\frac{1}{2}$	- 1.04	$\frac{1}{2}$	+ 3.85	$\frac{1}{2}$	+ 2.29	$\frac{1}{2}$	- 0.73	$\frac{1}{2}$	8.32	$\frac{1}{2}$
12	- 4.80	$\frac{1}{2}$	+ 0.20	$\frac{1}{2}$	+ 0.30	$\frac{1}{2}$	- 0.50	$\frac{1}{2}$	.....	.....	+ 0.20	$\frac{1}{2}$	- 0.30	$\frac{1}{2}$
14	- 5.57	$\frac{1}{2}$	- 0.74	$\frac{1}{2}$	- 3.90	$\frac{1}{2}$	+ 4.92	$\frac{1}{2}$	- 0.46	$\frac{1}{2}$	+ 1.86	$\frac{1}{2}$	.....	.....
15	.....	.....	- 0.93	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Weighted mean	+ 0.02		- 0.45		- 3.63		+ 3.92		+ 5.31		+ 4.32		- 5.29	
$V_a$	+ 1.05		+ 1.05		+ 0.35		- 0.34		- 0.34		- 0.71		- 0.71	
$V_s$	- .04		- .06		- .09		- .04		- .05		- .11		- .13	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 17.6		- 18.1		- 21.9		- 15.0		- 13.7		- 15.1		- 24.7	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	5001		5002		5007		5008		5011		5012		5016	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 10.76	$\frac{1}{2}$	.....	.....	- 2.62	$\frac{1}{2}$	.....	.....	+ 2.62	$\frac{1}{2}$	+ 7.48	$\frac{1}{2}$	+ 3.54	$\frac{1}{2}$
9	12.07	$\frac{1}{2}$	+ 8.94	$\frac{1}{2}$	- 1.12	$\frac{1}{2}$	+ 5.37	$\frac{1}{2}$	4.47	$\frac{1}{2}$	3.58	$\frac{1}{2}$	3.91	$\frac{1}{2}$
10	0.54	$\frac{1}{4}$	5.92	$\frac{1}{4}$	- 2.15	$\frac{1}{4}$	+ 1.40	$\frac{1}{4}$	3.23	$\frac{1}{2}$	2.48	$\frac{1}{2}$	1.61	$\frac{1}{4}$
11	1.04	$\frac{1}{2}$	5.72	$\frac{1}{2}$	+ 1.87	$\frac{1}{2}$	- 2.91	$\frac{1}{2}$	2.39	$\frac{1}{2}$	3.12	$\frac{1}{2}$	3.43	$\frac{1}{2}$
12	6.71	$\frac{1}{4}$	1.50	$\frac{1}{4}$	.....	.....	- 5.00	$\frac{1}{4}$	4.20	$\frac{1}{4}$	+ 2.30	$\frac{1}{4}$	11.21	$\frac{1}{4}$
14	+ 0.46	$\frac{1}{2}$	+ 4.92	$\frac{1}{4}$	- 0.93	$\frac{1}{4}$	- 2.32	$\frac{1}{4}$	+ 0.28	$\frac{1}{2}$	.....	.....	+ 5.30	$\frac{1}{4}$
15	.....	.....	.....	.....	.....	.....	+ 2.60	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....
Weighted mean	+ 5.02		+ 5.95		- 0.60		+ 0.20		+ 2.71		+ 3.67		+ 4.54	
$V_a$	- 1.39		- 1.39		- 1.74		- 1.74		- 4.16		- 4.16		- 5.47	
$V_d$	- .04		- .06		- .05		- .07		- .07		- .09		+ .02	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 15.0		- 14.1		- 21.0		- 20.2		- 20.1		- 19.2		- 18.5	

MEASURES OF  $\beta$  CORONÆ BOREALIS—*Continued.*

(Comparator Measures, Star Standard 4330).

Region	5018		5019		5023		5027		5028		5032		5035	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 3.94	$\frac{1}{2}$	.....	.....	+ 21.65	$\frac{1}{2}$	.....	.....	.....	.....	+ 25.58	$\frac{1}{2}$	+ 6.56	$\frac{1}{2}$
9	- 3.35	$\frac{1}{2}$	+ 1.12	$\frac{1}{2}$	8.72	$\frac{1}{2}$	+ 3.23	$\frac{1}{2}$	+ 6.71	$\frac{1}{2}$	14.87	$\frac{1}{2}$	12.52	$\frac{1}{2}$
10	- 3.12	$\frac{1}{2}$	- 1.08	$\frac{1}{2}$	5.38	$\frac{1}{2}$	16.64	$\frac{1}{2}$	12.60	$\frac{1}{2}$	13.46	$\frac{1}{2}$	4.31	$\frac{1}{2}$
11	.....	.....	- 5.93	$\frac{1}{2}$	5.20	$\frac{1}{2}$	15.01	$\frac{1}{2}$	13.00	$\frac{1}{2}$	16.51	$\frac{1}{2}$	4.68	$\frac{1}{2}$
12	.....	.....	.....	.....	4.50	$\frac{1}{2}$	.....	.....	6.01	$\frac{1}{2}$	.....	.....	.....	.....
14	.....	.....	.....	.....	+ 14.58	$\frac{1}{2}$	+ 8.36	$\frac{1}{2}$	14.68	$\frac{1}{2}$	+ 9.29	$\frac{1}{2}$	+ 5.39	$\frac{1}{2}$
15	.....	.....	.....	.....	.....	.....	.....	.....	+ 13.93	$\frac{1}{2}$	.....	.....	.....	.....
Weighted mean	- 1.80		- 1.96		+ 9.84		+ 11.98		+ 11.25		+ 15.05		+ 7.67	
$V_s$	- 5.47		- 5.47		- 8.37		- 10.81		- 10.81		- 11.63		- 12.50	
$V_d$	+ 0.04		$\pm$ .00		+ .06		- .05		- .07		+ .02		- .08	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 25.9		- 26.0		- 17.1		- 17.5		- 18.2		- 15.2		- 23.5	

MEASURES OF  $\beta$  CORONÆ BOREALIS—Continued.

(Comparator Measures, Star Standard 4330).

Region	5036		5041		5042		5049		5050		5054		5055	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 12.20	$\frac{1}{2}$	+ 14.43	$\frac{1}{2}$	.....	.....	+ 1.70	$\frac{1}{2}$	+ 12.46	$\frac{1}{2}$	+ 12.07	$\frac{1}{2}$	.....	.....
9	17.60	$\frac{1}{2}$	3.13	$\frac{1}{2}$	+ 4.69	$\frac{1}{2}$	15.65	$\frac{1}{2}$	8.72	$\frac{1}{2}$	12.86	$\frac{1}{2}$	+ 19.56	$\frac{1}{2}$
10	17.77	$\frac{1}{2}$	4.31	$\frac{1}{2}$	0.54	$\frac{1}{2}$	15.62	$\frac{1}{2}$	15.83	$\frac{1}{2}$	13.46	$\frac{1}{2}$	13.78	$\frac{1}{2}$
11	11.44	$\frac{1}{2}$	3.95	$\frac{1}{2}$	2.60	$\frac{1}{2}$	12.27	$\frac{1}{2}$	8.32	$\frac{1}{2}$	17.16	$\frac{1}{2}$	+ 14.56	$\frac{1}{2}$
12	10.40	$\frac{1}{2}$	7.01	$\frac{1}{2}$	1.30	$\frac{1}{2}$	8.71	$\frac{1}{2}$	15.81	$\frac{1}{2}$	11.71	$\frac{1}{2}$	.....	.....
14	13.66	$\frac{1}{2}$	+ 11.15	$\frac{1}{2}$	8.55	$\frac{1}{2}$	+ 12.54	$\frac{1}{2}$	12.08	$\frac{1}{2}$	10.96	$\frac{1}{2}$	.....	.....
15	+ 11.15	$\frac{1}{2}$	.....	.....	+ 4.76	$\frac{1}{2}$	.....	.....	+ 8.26	$\frac{1}{2}$	+ 13.92	$\frac{1}{2}$	.....	.....
Weighted mean	+ 14.07		+ 6.91		+ 3.72		+ 11.88		+ 11.49		+ 13.31		+ 15.62	
$V_a$	- 12.50		- 12.78		- 12.78		- 14.07		- 14.07		- 15.24		- 15.24	
$V_d$	- .09		- .18		- .19		- .04		- .05		- .14		- .15	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 17.1		- 24.6		- 27.8		- 20.8		- 21.3		- 20.7		- 18.4	

MEASURES OF  $\beta$  CORONÆ BOREALIS—*Continued.*

(Comparator Measures, Star Standard 4330).

Region	5058		5062		5064		5069		5071		5072		5086	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 11.81	$\frac{1}{2}$	+ 17.71	$\frac{1}{2}$	+ 27.81	$\frac{1}{2}$	+ 18.37	$\frac{1}{2}$	+ 21.25	$\frac{1}{2}$	+ 11.15	$\frac{1}{2}$	+ 26.90	$\frac{1}{2}$
9	19.56	$\frac{1}{2}$	15.09	$\frac{1}{2}$	15.09	$\frac{1}{2}$	12.30	$\frac{1}{2}$	17.33	$\frac{1}{2}$	11.52	$\frac{1}{2}$	9.84	$\frac{1}{2}$
10	13.14	$\frac{1}{2}$	+ 14.86	$\frac{1}{2}$	10.77	$\frac{1}{2}$	11.09	$\frac{1}{2}$	.....	.....	7.22	$\frac{1}{2}$	13.46	$\frac{1}{2}$
11	11.75	$\frac{1}{2}$	.....	.....	16.95	$\frac{1}{2}$	+ 12.27	$\frac{1}{2}$	14.56	$\frac{1}{2}$	14.87	$\frac{1}{2}$	15.08	$\frac{1}{2}$
12	15.01	$\frac{1}{2}$	.....	.....	14.71	$\frac{1}{2}$	.....	.....	.....	.....	+ 8.71	$\frac{1}{2}$	16.72	$\frac{1}{2}$
14	20.90	$\frac{1}{2}$	.....	.....	+ 13.93	$\frac{1}{2}$	.....	.....	+ 14.86	$\frac{1}{2}$	.....	.....	+ 15.61	$\frac{1}{2}$
15	+ 15.44	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Weighted mean	+ 17.38		+ 15.89		+ 16.42		+ 13.26		+ 17.00		+ 11.41		+ 16.07	
$V_a$	- 15.47		- 16.10		- 17.31		- 16.91		- 17.08		- 17.08		- 18.11	
$V_d$	- .19		- .11		- .14		- .18		- .03		- .05		- .14	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 16.9		- 18.9		- 19.6		- 22.4		- 18.7		- 24.3		- 20.8	

MEASURES OF  $\beta$  CORONÆ BOREALIS—*Concluded.*

(Comparator Measures, Star Standard 4330).

Region	5087		5091		5092		5111		5112		5121		5122	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
5	+ 14.17	$\frac{1}{2}$	+ 13.51	$\frac{1}{2}$	+ 25.58	$\frac{1}{2}$	+ 30.83	$\frac{1}{2}$	+ 30.83	$\frac{1}{2}$	+ 24.27	$\frac{1}{2}$	+ 27.94	$\frac{1}{2}$
8											26.17	$\frac{1}{2}$		
9	13.42	$\frac{1}{2}$	25.71	$\frac{1}{2}$	14.53	$\frac{1}{2}$	27.39	$\frac{1}{2}$	20.68	$\frac{1}{2}$	30.74	$\frac{1}{2}$	31.53	$\frac{1}{2}$
10			21.00	$\frac{1}{2}$	12.17	$\frac{1}{2}$	23.69	$\frac{1}{2}$	20.25	$\frac{1}{2}$	22.94	$\frac{1}{2}$	24.23	$\frac{1}{2}$
11	+ 15.29	$\frac{1}{2}$	21.84	$\frac{1}{2}$	13.52	$\frac{1}{2}$	24.96	$\frac{1}{2}$	+ 28.08	$\frac{1}{2}$	24.96	$\frac{1}{2}$	22.36	$\frac{1}{2}$
12			17.02	$\frac{1}{2}$	5.80	$\frac{1}{2}$	18.02	$\frac{1}{2}$			22.22	$\frac{1}{2}$	24.22	$\frac{1}{2}$
14			+ 15.33	$\frac{1}{2}$	+ 10.40	$\frac{1}{2}$	+ 19.32	$\frac{1}{2}$			22.30	$\frac{1}{2}$	+ 21.37	$\frac{1}{2}$
15											+ 18.41	$\frac{1}{2}$		
Weighted mean	+ 14.54		+ 20.24		+ 13.38		+ 23.99		+ 24.10		+ 24.43		+ 25.27	
V <sub>a</sub>	- 18.11		- 18.26		- 18.26		- 19.84		- 19.84		- 20.19		- 20.19	
V <sub>d</sub>	- .15		- .16		- .18		- .08		- .10		- .15		- .17	
Standard	- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60		- 18.60	
Radial Velocity	- 22.3		- 16.8		- 23.7		- 14.5		- 14.4		- 14.5		- 13.7	

The observations were divided into fourteen groups and the mean phases and velocities computed. (See Table II.)

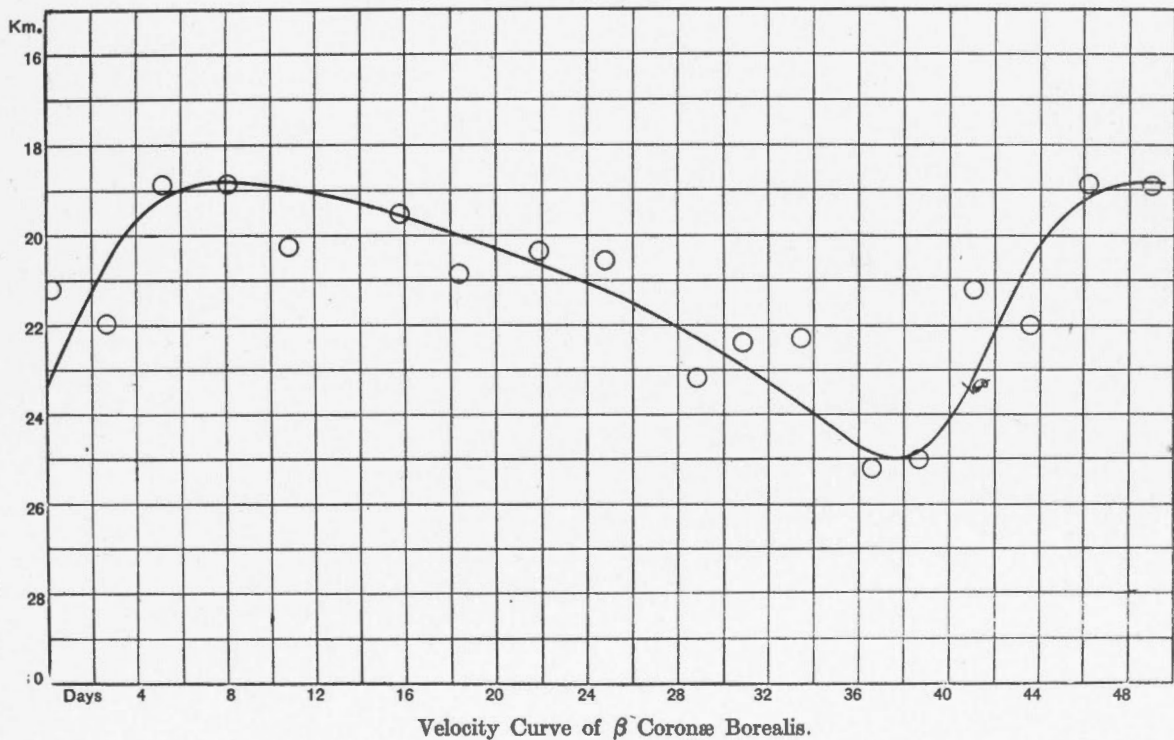
TABLE II.  
NORMAL PLACES.

No.	Julian Day.	Phase.	Velocity.	Weight.	Residual O-C.
1	2,419,156.78	28.94	- 23.20	2.0	- 0.86
2	348.87	30.87	- 22.40	2.0	+ 0.53
3	203.67	33.68	- 22.30	1.0	+ 1.58
4	143.96	36.57	- 25.20	1.0	- 0.33
5	249.77	38.71	- 25.00	2.0	- 0.09
6	271.19	0.23	- 21.20	1.0	+ 2.00
7	191.77	2.68	- 22.00	2.0	- 1.40
8	416.01	5.23	- 18.90	2.0	+ 0.30
9	389.20	8.09	- 18.90	2.0	- 0.10
10	322.50	10.87	- 20.30	2.5	- 1.38
11	223.14	15.85	- 19.60	2.0	- 0.05
12	213.95	18.44	- 20.90	2.0	- 0.92
13	295.77	21.93	- 20.40	2.0	- 0.33
14	347.84	24.83	- 20.60	1.0	+ 0.68

These fourteen normals were plotted and a curve determined graphically which fitted them very satisfactorily. This was as far as the work was carried, as it was not considered that the results arrived at were sufficiently definite to authorize an attempt at greater exactness in the final values of the elements of the curve. First, the accuracy of the measures, considering the small total range, cannot be taken as very great. Second, the sine curve of the third body with which the bright body and its companion form the long period oscillation cannot be considered very well defined. So that although these measures and the curve given by the third body seem to be the best so far obtainable, it would take many more observations and very close measuring to enable one to assert definitely that this is the true condition of affairs existing in the system.

The elements of the curve are:

$$\begin{aligned}
 P &= 40.9 \text{ days} \\
 e &= .4 \\
 \omega &= 240^\circ \\
 T &= 2,418,739.29 \text{ J. D.} \\
 K &= 3.10 \text{ km.} \\
 \gamma &= -21.28 \text{ km.} \\
 a \sin i &= 1,600,000 \text{ km.}
 \end{aligned}$$



The probable error of an average observation was computed to be  $\pm 2.6$  km. and of an average normal place  $\pm 0.63$  km.

Dominion Observatory,  
Ottawa,  
September, 1912.