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RADIAL VELOCITIES OF 99 STARS OF THE SECOND AND THIRD SPECTRAL CLASSES OBSERVED AT BONN

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During the years 1903 to 1907 I have, in collaboration with Dr. W. Zurhellen, obtained spectrograms of nearly all stars of the second and third spectral classes down to the fourth visual, or fifth photographic magnitude, which could be observed in Bonn, using the photographic refractor by Repsold and Steinheil of aperture 30 cm, and focal-length 5.1 m. The radial velocities resulting from provisional computations are briefly communicated herewith. The definitive results will be published later *in extenso* in the *Veröffentlichungen der Bonner Sternwarte*, but they will not differ much from the values given here.

The spectrograph employed was constructed by Töpfer of Potsdam, and has three 60° prisms of heavy Jena flint, which are set at the minimum of deviation for $H\gamma$. The height of the prisms is 32 mm, and the lengths of their sides are 52, 54, and 56 mm. The collimating lens is of 28 mm aperture and 450 mm focal-length, and the camera lens of 30 mm aperture and 361 mm focal-length. The spectrum is sharply defined from λ 4150 to λ 4500. At medium temperature the dispersion is as follows:

λ	Dispersion for One Tenth-Meter	Tenth-Meters per mm
4200	46.″2 = 0.081 mm	12.4
4300	39.8 0.070	14.4
$H\gamma$	37.6 0.066	15.2
4400	34.6 0.061	16.5
4500	30.6 0.054	18.7

The spectrograph is automatically kept at constant temperature by electric means. The light of the iron arc has served for comparison after being diffusely projected through a ground-glass disk upon the slit. From two to five exposures of the comparison spectrum are made, according to the length of the exposure on the star.

A microscope by Töpfer, the screw of which has a pitch of $\frac{1}{4}$ mm, has served for the measurement of the spectrograms. The spectrograms of the first year, 1903, were measured both by myself and by Zurhellen, and my measurements are distinguished in the following list by a * attached to the plate number. The results of the two observers may be regarded as practically independent, inasmuch as we intentionally observed lines as different as possible. I have already published in detail these measurements in 1903, in *Astronomische Nachrichten*, Nos. 3972–73 (**166**, 177, 1904); the results must be briefly repeated, however, in connection with the subsequent measures. The spectrograms of the years 1904 to 1907 were all measured by Mr. Zurhellen alone, who has carried out this arduous work with great care. All the measures were in every case made in both positions of the plate, with red to right and red to left, and the mean was used in the computations. The wave-lengths of the *Fe* lines, as a rule extending from λ 4210 to λ 4482, were taken from Kayser, the wave-lengths of the stellar lines, from λ 4220 to 4475, from Rowland.

The following tabulation of the resulting radial velocities requires little explanation. Below the name of the star is given the right ascension and declination for 1900, the spectral type according to Miss Maury (*Harvard Annals*, **28**) and the photographic magnitude according to the *Draper Catalogue* (*Harvard Annals*, **27**). The column "Exposure" gives the duration in minutes, in parentheses when there was interference by clouds, and the initial of the observer, K or Z; in taking some plates the observers exchanged places, which is indicated by KZ. The column "Red. to ⊙" contains the sum of the annual and daily components of the velocity of the earth, the first being computed by Schlesinger's table in the *Astrophysical Journal* (**10**, 1, 1899). The last two columns contain the number m of the star lines measured and the average deviation $\frac{1}{m}\Sigma v$ of the separate lines from the mean for the plate.

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\Sigma v$
				δ Andromedae				
				α $0^h\,34^m.0$, $\delta +30^\circ\,19'$		Type XV, Mag. 4.79		
		min.		km	km	km		km
492	1905, Oct. 20.424	(110) Z	$0^h\,1^m$	+ 1.48	− 3.45	− 1.97	16	±1.9
777	1906, Oct. 8.495	105 Z	+0 52	− 5.75	+ 2.20	− 3.55	17	3.3
793	1906, Nov. 10.433	120 Z	+1 34	+ 9.81	−12.92	− 3.11	14	1.8
1009	1907, Nov. 1.451	120 Z	+1 24	+ 3.32	− 8.85	− 5.53	20	1.7
						Mean:		− 3.54
				α Cassiopeiae				
				α $0^h\,34^m.8$, $\delta +56^\circ\,0'$		Type XV, Mag. 3.88		
278	1904, Oct. 19.416	51 K	−0 15	− 5.73	+ 3.38	− 2.35	16	±1.7
281	1904, Oct. 27.430	53 K	+0 36	− 2.43	+ 0.52	− 1.91	15	1.4
510	1905, Nov. 30.303	62 K	−0 15	+ 7.91	−10.97	− 3.06	20	2.1
820	1906, Dec. 23.221	60 K	−0 43	+14.43	−16.92	− 2.49	25	1.7
						Mean:		− 2.45
				β Ceti				
				α $0^h\,38^m.5$, $\delta -18^\circ\,32'$		Type XV, Mag. 3.86		
311	1905, Jan. 1.238	60 K	+0 16	+42.33	−27.93	+14.40	16	±1.8
313	1905, Jan. 2.230	60 K	+0 8	+43.01	−27.84	+15.17	15	1.6
525	1905, Dec. 18.285	70 K	+0 26	+43.27	−28.22	+15.05	16	1.3
1031	1907, Nov. 21.350	85 K	+0 12	+38.60	−23.85	+14.75	17	1.9
						Mean:		+14.84
				η Cassiopeiae				
				α $0^h\,43^m.0$, $\delta +57^\circ\,17'$		Type XIII, Mag. 4.73		
751	1906, Aug. 29.545	105 Z	−0 42	− 7.40	+17.83	+10.43	25	±2.0
802	1906, Nov. 23.297	112 Z	−1 00	+18.88	− 7.75	+11.13	25	2.8
808	1906, Dec. 18.241	100 Z	−0 42	+23.38	−15.11	+ 8.27	19	2.7
1008	1907, Nov. 1.364	100 Z	−0 51	+ 9.71	− 0.04	+ 9.67	20	1.4
						Mean:		+ 9.88
				β Andromedae				
				α $1^h\,4^m.1$, $\delta +35^\circ\,5'$		Type XVII, Mag. 4.57		
537	1905, Dec. 31.261	80 K	+0 18	+27.31	−25.65	+ 1.66	29	±2.1
540	1906, Jan. 1.260	90 K	+0 21	+27.22	−25.81	+ 1.41	26	2.5
821	1906, Dec. 23.311	90 K	+0 58	+25.25	−24.12	+ 1.13	19	2.4
1016	1907, Nov. 4.443	100 Z	+0 54	+ 7.91	− 6.17	+ 1.74	20	2.3
						Mean:		+ 1.49

Plate No.	Date Greenwich M. T.	Expo-sure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\Sigma v$
		min.		km	km	km		km
			α Ursae minoris					
			α 1h 22m6, δ +88° 46′		Type XIII, Mag. bright			
104*	1903, July 2.371	60 K	− 9h20m	−17.45	+ 2.57	−14.88	16	±1.6
104	1903, July 2.371	60 K	− 9 20	−16.13	+ 2.57	−13.56	18	2.4
106*	1903, July 4.470	79 K	− 6 50	−18.70	+ 2.99	−15.71	17	2.3
106	1903, July 4.470	79 K	− 6 50	−19.51	+ 2.99	−16.52	17	1.8
408	1905, May 30.361	50 K	−11 43	− 7.77	− 3.88	−11.65	16	2.0
410	1905, May 31.369	25 K	−11 27	−11.43	− 3.69	−15.12	14	2.7
414	1905, June 19.371	40 K	−10 10	−13.41	+ 0.08	−13.33	16	2.5
						Velocity variable		
			η Piscium					
			α 1h 26m1, δ +14° 50′		Type XIV, Mag. 5.02			
293	1904, Nov. 15.398	122 Z	+0 13	+28.67	−14.24	+14.43	14	±1.5
505	1905, Nov. 27.383	(100)Z	+0 37	+34.04	−19.38	+14.66	17	1.8
837	1907, Jan. 24.261	100 Z	+1 30	+45.66	−29.93	+15.73	18	1.9
1033	1907, Nov. 22.435	108 Z	+1 31	+31.41	−17.14	+14.27	16	1.7
						Mean: +14.77		
			υ Persei					
			α 1h 31m8, δ +48° 7′		Type XV, Mag. 5.10			
515	1905, Dec. 1.422	100 Z	+1 44	+29.12	−11.81	+17.31	16	±3.0
830	1907, Jan. 23.253	100 Z	+1 9	+42.68	−24.41	+18.27	19	2.6
839	1907, Jan. 26.245	100 Z	+1 9	+43.05	−24.56	+18.49	25	1.9
1036	1907, Dec. 4.306	105 Z	−0 54	+31.21	−12.56	+18.65	16	1.7
						Mean: +18.18		
			γ Andromedae, maj. dpl.					
			α 1h 57m8, δ +41° 51′		Type XV, Mag. 4.05			
290	1904, Nov. 14.448	53 K	+0 49	− 5.19	− 4.67	− 9.86	16	±1.4
320	1905, Jan. 8.340	50 K	+1 51	+13.50	−24.35	−10.85	15	1.4
557	1906, Jan. 17.272	65 K	+0 47	+15.69	−25.71	−10.02	16	2.6
1020	1907, Nov. 5.464	75 Z	+0 34	−10.82	− 0.16	−10.98	20	1.7
						Mean: −10.43		
			α Arietis					
			α 2h 1m5, δ +23° 0′		Type XV, Mag. 4.13			
259	1904, Aug. 25.601	40 Z	−0 52	−38.37	+25.94	−12.43	20	±2.0
295	1904, Nov. 16.382	51 Z	−0 42	− 2.21	− 9.35	−11.56	20	1.9
299	1904, Dec. 21.325	45 K	+0 14	+10.68	−23.95	−13.27	20	1.8
314	1905, Jan. 2.283	40 K	0 0	+12.75	−27.11	−14.36	20	1.5
507	1905, Nov. 28.374	50 Z	−0 6	+ 2.70	−14.94	−12.24	20	2.0
558	1906, Jan. 22.224	50 K	−0 6	+16.66	−29.66	−13.00	20	1.9
						Mean: −12.81		

Plate No.	Date Greenwich M. T.	Expo-sure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				ξ′ Ceti				
				α $2^h\,7^m.7$, δ +8° 23′		Type XIV ?, Mag. 5.09		
		min.		km	km	km		km
526	1905, Dec. 18.369	120 Z	+0h59m	+23.74	−24.44	− 0.70	14	±3.3
824	1907, Jan. 22.264	120 Z	+0 44	+22.46	−30.20	− 7.74	23	3.0
843	1907, Jan. 29.251	120 Z	+0 53	+20.60	−30.05	− 9.45	17	2.1
1037	1907, Dec. 16.405	120 Z	+1 41	+15.27	−23.65	− 8.38	16	1.8
						Velocity variable		
				o Ceti, dark lines				
				α $2^h\,14^m.3$, δ −3° 26′		Type XX, Mag. var.		
804	1906, Dec. 7.377	100 Z	+0 20	+87.14	−20.60	+66.54	16	±3.9
810	1906, Dec. 18.351	90 KZ	+0 26	+92.25	−24.16	+68.09	13	4.9
818	1906, Dec. 22.354	100 KZ	+0 46	+89.06	−25.27	+63.79	14	3.4
						Mean: +66.14		
				o Ceti, $H\gamma$ bright line				
804	1906, Dec. 7.377	100 Z	+0 20	+71.10	−20.60	+50.50	1	
807	1906, Dec. 12.356	(40) Z	+0 9	+75.00	−22.30	+52.70	1	
809	1906, Dec. 18.305	20 K	−0 40	+73.95	−24.06	+49.89	1	
810	1906, Dec. 18.351	90 KZ	+0 26	+76.93	−24.16	+52.77	1	
813	1906, Dec. 21.302	16 K	−0 33	+75.40	−24.90	+50.50	1	
817	1906, Dec. 22.310	17 K	−0 18	+72.85	−25.18	+47.67	1	
818	1906, Dec. 22.354	100 KZ	+0 46	+76.97	−25.27	+51.70	1	
822	1906, Dec. 23.362	12 K	+1 2	+74.20	−25.55	+48.65	1	
						Mean of 4 long expos.: +51.92		
						Mean of 4 short expos.: +49.18		
				α Ceti				
				α $2^h\,57^m.1$, δ +3° 42′		Type XVII, Mag. 4.63		
300	1904, Dec. 21.396	100 Z	+1 1	− 2.37	−21.61	−23.98	10	±2.0
528	1905, Dec. 25.383	100 K	+0 57	− 0.71	−22.89	−23.60	14	2.1
555	1906, Jan. 16.292	120 KZ	+0 13	+ 5.89	−28.18	−22.29	17	3.1
852	1907, Feb. 5.247	100 Z	+0 26	+ 5.57	−29.46	−23.89	12	2.2
						Mean: −23.44		
				γ Persei				
				α $2^h\,57^m.5$, δ +53° 7′		Type XIV, Mag. 4.01		
527	1905, Dec. 18.463	70 K	+2 23	+14.77	−11.78	+ 2.99	17	±2.5
567	1906, Jan. 23.292	80 K	+0 40	+23.76	−22.39	+ 1.37	18	3.2
831	1907, Jan. 23.341	75 K	+1 50	+22.83	−22.40	+ 0.43	13	1.6
853	1907, Feb. 7.255	70 K	+0 44	+25.89	−24.39	+ 1.50	19	2.4
						Mean: + 1.57		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				κ Persei				
	α $3^h\,2^m.7$, δ $+44°\,29'$			Type XV, Mag. 5.12				
		min.		km	km	km		km
328	1905, Jan. 14.333	120 Z	$+0^h59^m$	+53.38	−22.99	+30.39	16	±1.4
529	1905, Dec. 26.397	115 K	+1 16	+47.24	−16.92	+30.32	17	2.8
823	1907, Jan. 13.370	(120)Z	+1 47	+53.73	−22.63	+31.10	22	1.6
						Mean: +30.60		
				α Persei				
	α $3^h\,17^m.2$, δ $+49°\,30'$			Type XII*ac*, Mag. bright				
264	1904, Aug. 29.639	21 Z	−0 58	−27.55	+25.40	− 2.15	20	±2.2
270	1904, Sept. 11.680	25 Z	+0 53	−26.08	+24.14	− 1.94	20	2.5
291	1904, Nov. 14.488	27 K	+0.29	− 6.74	+ 3.53	− 3.21	19	2.4
303	1904, Dec. 22.358	25 K	−0 10	+11.92	−13.09	− 1.17	20	2.6
559	1906, Jan. 22.271	25 K	−0 13	+21.04	−22.81	− 1.77	20	2.2
600	1906, Mar. 7.239	27 K	+1 54	+21.97	−25.18	− 3.21	20	2.6
						Mean: − 2.24		
				ζ Tauri				
	α $3^h\,25^m.4$, δ $+12°\,36'$			Type XV?, Mag. 5.11				
331	1905, Jan. 15.357	120 KZ	+1 15	+53.43	−26.80	+26.63	15	±1.6
842	1907, Jan. 27.307	(100)KZ	+0 50	+45.32	−28.96	+16.36	17	2.6
847	1907, Feb. 1.300	120 Z	+0 59	+45.40	−29.56	+15.84	16	3.1
						Velocity variable		
				γ Tauri				
	α $4^h\,14^m.1$, δ $+15°\,23'$			Type XIV?, Mag. 4.85				
854	1907, Feb. 7.327	102 Z	+1 11	+67.61	−28.76	+38.85	20	±3.0
857	1907, Feb. 9.282	100 Z	+0 15	+69.87	−28.98	+40.89	16	2.0
867	1907, Mar. 2.298	108 Z	+2 1	+68.98	−29.86	+39.12	18	2.4
						Mean: +39.62		
				δ Tauri				
	α $4^h\,17^m.2$, δ $+17°\,18'$			Type XV, Mag. 5.00				
346	1905, Jan. 26.376	105 Z	+1 34	+70.26	−26.31	+43.95	17	±2.0
815	1906, Dec. 21.460	120 Z	+1 11	+52.60	−12.28	+40.32	14	2.2
825	1907, Jan. 22.369	120 KZ	+1 6	+63.02	−25.03	+37.99	29	2.2
						Velocity variable?		
				ε Tauri				
	α $4^h\,22^m.8$, δ $+18°\,58'$			Type XV?, Mag. 4.83				
344	1905, Jan. 23.381	115 Z	+1 24	+65.28	−25.06	+40.22	16	±1.2
572	1906, Jan. 24.355	115 Z	+0 49	+63.01	−25.23	+37.78	21	2.1
819	1906, Dec. 22.447	120 Z	+0 51	+52.22	−11.98	+40.24	19	2.2
						Mean: +39.41		

Plate No.	Date Greenwich M. T.	Expo-sure	Hour Angle	Observed Velocity	Red. to ☉	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				α Tauri				
	α 4h 30m2, δ +16° 19′			Type XVI, Mag. 3.94				
		min.		km	km	km		km
312	1905, Jan. 1.352	50 K	−0h52m	+72.34	−16.06	+56.28	15	±1.9
315	1905, Jan. 2.366	38 K	−0 27	+73.12	−16.53	+56.59	15	1.6
321	1905, Jan. 8.392	40 K	+0 34	+75.88	−19.17	+56.71	15	1.5
354	1905, Feb. 9.311	50 K	+0 43	+84.35	−28.49	+55.86	15	2.3
481	1905, Sept. 22.698	47 Z	+0 48	+28.86	+27.33	+56.19	20	1.9
516	1905, Dec. 1.501	50 Z	+0 39	+55.57	− 0.68	+54.89	20	1.9
769	1906, Sept. 24.691	57 Z	+0 44	+28.98	+27.01	+55.99	20	1.9
					Mean:	+56.07		
				π3 Orionis				
	α 4h 44m3, δ +6° 47′			Type XIII*a*, Mag. 4.05				
334	1905, Jan. 20.370	90 Z	+0 35	+47.60	−22.15	+25.45	14	±2.2
561	1906, Jan. 22.412	80 K	+1 42	+49.90	−22.80	+27.10	16	3.5
811	1906, Dec. 18.457	100 Z	+0 29	+33.75	− 7.98	+25.77	12	2.9
					Mean:	+26.11		
				ι Aurigae				
	α 4h 50m4, δ +33° 0′			Type XV, Mag. 4.87				
339	1905, Jan. 22.384	100 Z	+0 57	+40.72	−21.67	+19.05	13	±1.9
523	1905, Dec. 17.441	100 Z	−0 4	+24.61	− 5.32	+19.29	17	2.4
844	1907, Jan. 29.350	(90)KZ	+0 34	+43.46	−23.78	+19.68	22	1.8
					Mean:	+19.34		
				ν Aurigae				
	α 5h 44m6, δ +39° 7′			Type XVI ?, Mag. 5.17				
351	1905, Feb. 8.378	120 Z	+1 1	+34.57	−22.92	+11.65	13	±2.4
576	1906, Feb. 5.392	120 Z	+1 8	+31.59	−21.89	+ 9.70	15	1.9
871	1907, Mar. 3.335	120 Z	+1 28	+39.16	−27.91	+11.25	18	2.2
					Mean:	+10.87		
				α Orionis				
	α 5h 49m8, δ +7° 23′			Type XVIII, Mag. bright				
356	1905, Feb. 9.407	60 Z	+1 41	+51.00	−23.11	+27.89	10	±2.8
367	1905, Mar. 1.309	62 Z	+0 39	+52.84	−27.54	+25.30	11	2.5
533	1905, Dec. 30.474	80 K	+1 35	+32.24	− 5.78	+26.46	18	2.7
591	1906, Mar. 4.317	60 Z	+1 1	+54.58	−27.94	+26.64	15	2.1
					Mean:	+26.57		
				δ Aurigae				
	α 5h 51m3, δ +54° 17′			Type XV, Mag. 4.81				
874	1907, Mar. 4.323	95 Z	+1 8	+35.96	−24.78	+11.18	19	±1.6
882	1907, Mar. 7.307	90 Z	+0 57	+36.57	−25.09	+11.48	17	2.4
892	1907, Mar. 21.293	(88)KZ	+1 32	+35.85	−25.72	+10.13	23	1.7
					Mean:	+10.93		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				μ Geminorum				
			$\alpha\ 6^h\ 16^m.9$, $\delta + 22°\ 34'$		Type XVIII, Mag. 4.85			
		min.		km	km	km		km
530	1905, Dec. 26.503	100 K	$+0^h35^m$	+57.99	− 0.42	+57.57	14	±2.5
573	1906, Jan. 24.447	100 Z	+1 8	+72.16	−15.06	+57.10	14	2.7
826	1907, Jan. 22.471	120 Z	+1 33	+70.40	−14.07	+56.33	16	2.8
						Mean: +57.00		
				ε Geminorum				
			$\alpha\ 6^h\ 37^m.8$, $\delta + 25°\ 14'$		Type XIV, Mag. 4.66			
370	1905, Mar. 8.366	90 Z	+1 40	+39.08	−27.90	+11.18:	11	±2.1
379	1905, Mar. 22.310	(130)KZ	+1 15	+38.15	−29.63	+ 8.52	15	1.5
588	1906, Feb. 28.376	(110)Z	+1 23	+34.86	−26.06	+ 8.80	18	2.5
833	1907, Jan. 23.468	105 Z	+1 12	+21.20	−12.29	+ 8.91	22	1.8
						Mean: + 9.35		
				α Canis minoris				
			$\alpha\ 7^h\ 34^m.1$, $\delta + 5°\ 29'$		Type XII*a*, Mag. bright			
347	1905, Jan. 26.442	10 K	−0 7	+ 1.07	− 5.77	− 4.70	15	±0.8
359	1905, Feb. 13.352	(32)K	−1 6	+11.09	−14.13	− 3.04	14	1.8
381	1905, Apr. 13.294	18 K	+1 22	+25.27	−28.60	− 3.33	20	1.5
497	1905, Nov. 3.740	18 Z	+1 31	−31.76	+27.42	− 4.34	20	1.5
534	1905, Dec. 30.522	16 K	0 0	−11.15	+ 7.90	− 3.25	20	1.9
627	1906, Mar. 28.292	14 K	+0 16	+23.76	−27.23	− 3.47	20	2.1
794	1906, Nov. 10.684	20 Z	+0 35	−29.53	+26.34	− 3.19	20	1.4
						Mean: − 3.62		
				κ Geminorum				
			$\alpha\ 7^h\ 38^m.4$, $\delta + 24°\ 38'$		Type XIV, Mag. 4.62			
372	1905, Mar. 13.421	115 Z	+2 19	+48.44	−25.90	+22.54	14	±2.1
375	1905, Mar. 20.373	120 Z	+1 36	+49.58	−27.44	+22.14	16	1.8
602	1906, Mar. 7.363	120 Z	+0 31	+45.15	−24.00	+21.15	19	2.8
883	1907, Mar. 7.387	90 KZ	+1 5	+44.85	−23.96	+20.89	22	2.6
						Mean: +21.68		
				β Geminorum				
			$\alpha\ 7^h\ 39^m.2$, $\delta + 28°\ 16'$		Type XV, Mag. bright			
130	1904, Apr. 15.367	30 K	+3 11	+35.06	−29.61	+ 5.45	14	±1.5
287	1904, Oct. 30.687	(47)Z	−0 6	−24.81	+28.61	+ 3.80	15	1.3
368	1905, Mar 1.408	36 Z	+1 12	+26.16	−22.22	+ 3.94	16	1.1
368[1]	1905, Mar. 1.408	36 Z	+1 12	+26.49	−22.22	+ 4.27	20	1.4
382	1905, Apr. 13.330	39 K	+2 9	+33.42	−29.62	+ 3.80	20	1.9
385	1905, Apr. 14.323	42 K	+2 3	+34.66	−29.60	+ 5.06	20	1.7
494	1905, Nov. 3.668	34 Z	−0 18	−22.81	+28.04	+ 5.23	20	1.2
563	1906, Jan 22.501	30 K	+0 55	+10.90	− 5.20	+ 5.70	20	1.2
563[1]	1906, Jan. 22.501	30 K	+0 55	+10.46	− 5.20	+ 5.26	20	1.8
909	1907, Mar. 28.301	40 K	+0 23	+33.85	−28.49	+ 5.36	20	2.0
						Mean: + 4.79		

[1] Second measure with partially different lines.

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				β Cancri				
				$\alpha\ 8^h\ 11^m1,\ \delta +9°\ 30'$		Type XV, Mag. 5.06		
		min.		km	km	km		km
634	1906, Apr. 2.325	120 KZ	$+0^h46^m$	+51.95	−27.26	+24.69	12	±3.0
897	1907, Mar. 24.328	125 KZ	+0 14	+51.20	−25.23	+25.97	13	2.5
914	1907, Mar. 29.357	140 KZ	+1 15	+51.67	−26.47	+25.20	15	2.9
						Mean: +25.29		
				o Ursae majoris				
				$\alpha\ 8^h\ 22^m0,\ \delta +61°\ 3'$		Type XIV, Mag. 4.66		
855	1907, Feb. 7.418	90 KZ	−0 45	+29.81	− 9.97	+19.84	23	±2.6
860	1907, Feb. 9.407	100 KZ	−0 53	+31.61	−10.68	+20.93	16	2.6
886	1907, Mar. 9.312	(35) Z	−1 20	+40.52	−18.81	+21.71	16	2.8
900	1907, Mar. 26.306	80 KZ	−0 21	+42.45	−21.69	+20.76	28	2.4
						Mean: +20.81		
				ι Cancri				
				$\alpha\ 8^h\ 40^m6,\ \delta +29°\ 7'$		Type XIV, Mag. 4.85		
584	1906, Feb. 15.495	110 Z	+1 20	+28.74	−10.57	+18.17	14	±1.7
894	1907, Mar. 22.408	120 Z	+1 31	+40.61	−24.19	+16.42	13	2.1
910	1907, Mar. 28.369	120 Z	+0 59	+41.89	−25.72	+16.17	14	2.7
918	1907, Mar. 30.365	140 Z	+1 1	+43.74	−26.18	+17.56	14	2.4
						Mean: +17.08		
				ζ Hydrae				
				$\alpha\ 8^h\ 50^m1,\ \delta +6°\ 19'$		Type XV, Mag. 4.42		
365	1905, Feb. 28.425	(65)Z	+0 22	+37.29	−12.78	+24.51	16	±4.0
638	1906, Apr. 3.333	90 KZ	+0 23	+49.43	−25.05	+24.38	25	2.4
875	1907, Mar. 4.460	90 Z	+1 27	+38.03	−14.44	+23.59	20	2.2
						Mean: +24.16		
				40 Lyncis				
				$\alpha\ 9^h\ 15^m0,\ \delta +34°\ 49'$		Type XVI, Mag. 4.98		
613	1906, Mar. 17.435	120 Z	+1 17	+60.66	−20.18	+40.48	10	±4.3
639	1906, Apr. 3.412	120 Z	+1 52	+64.17	−25.04	+39.13	19	2.2
898	1907, Mar. 24.425	120 KZ	+1 30	+62.60	−22.36	+40.24	15	2.7
942	1907, Apr. 24.354	120 Z	+1 50	+65.56	−27.99	+37.57	19	2.4
						Mean: +39.35		
				α Hydrae				
				$\alpha\ 9^h\ 22^m7,\ \delta -8°\ 13'$		Type XV, Mag. 4.16		
136	1904, Apr. 20.342	66 K	+1 12	+21.95	−24.58	− 2.63	14	±1.8
608	1906, Mar. 14.436	90 Z	+0 59	+ 9.03	−12.45	− 3.42	22	2.6
621	1906, Mar. 26.377	90 Z	+0 21	+15.02	−17.15	− 2.13	23	2.2
901	1907, Mar. 26.380	80 K	+0 24	+15.18	−17.06	− 1.88	16	2.2
						Mean: − 2.51		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
		min.		km	km	km		km

θ Ursae majoris

α 9h 26m2, δ +52° 8′ Type XIII*a*, Mag. 4.14

376	1905, Mar. 20.466	60 Z	+2h 4m	+35.46	−19.61	+15.85	15	±1.9
383	1905, Apr. 13.408	88 Z	+2 14	+39.97	−23.74	+16.23	13	2.1
603	1906, Mar. 7.452	92 Z	+0 51	+30.25	−15.72	+14.53	18	2.4
926	1907, Apr. 1.381	75 K	+0 47	+39.01	−21.99	+17.02	16	1.8

Mean: +15.91

ε Leonis

α 9h 40m2, δ +24° 14′ Type XIV *P*, Mag. 4.34

73*	1903, May 24.379	78 K	+3 59	+34.01	−28.50	+ 5.51	15	±2.8
73	1903, May 24.379	78 K	+3 59	+34.02	−28.50	+ 5.52	15	2.8
141	1904, Apr. 24.399	80 K	+2 32	+35.05	−28.19	+ 6.86	15	1.6
395	1905, Apr. 25.379	72 K	+2 7	+33.76	−28.26	+ 5.50	22	2.0
402	1905, May 15.349	(80)K	+2 41	+35.20	−29.11	+ 6.09	15	1.8

Mean: + 5.90

γ Leonis, maj. dpl.

α 10h 14m5, δ +20° 21′ Type XV, Mag. 3.72

54*	1903, May 4.421	60 K	+3 6	− 7.22	−28.25	−35.47	13	±2.6
54	1903, May 4.421	60 K	+3 6	− 6.58	−28.25	−34.83	15	2.6
148	1904, May 9.415	68 K	+3 20	− 4.88	−28.87	−33.75	15	1.8
397	1905, May 3.349	60 Z	+1 21	− 6.59	−28.07	−34.66	15	1.0
929	1907, Apr. 2.422	70 K	+1 2	−15.15	−20.04	−35.19	30	2.1
948	1907, May 11.344	75 K	+1 43	− 5.81	−28.88	−34.69	20	2.3

Mean: −34.77

μ Ursae majoris

α 10h 16m4, δ +42° 0′ Type XVI, Mag. 4.88

137	1904, Apr. 20.451	118 Z	+2 54	+11.99	−24.43	−12.44	15	±1.6
155	1904, May 16.376	90 KZ	+2 50	+16.39	−25.79	− 9.40	14	1.7
679	1906, May 3.377	(120)Z	+1 57	+11.46	−25.65	−14.19	14	3.0
680	1906, May 8.359	100 Z	+1 51	+10.95	−25.84	−14.89	13	3.4
681	1906, May 11.358	(120)Z	+2 1	+ 7.27:	−25.87	−18.60:	9	4.4

Velocity variable

46 *Leonis minoris*

α 10h 47m7, δ +34° 45′ Type XV, Mag. 4.95

635	1906, Apr. 2.425	120 KZ	+0 33	+36.99	−18.02	+18.97	18	±3.2
906	1907, Mar. 27.477	120 Z	+1 23	+32.90	−15.84	+17.06	21	1.9
915	1907, Mar. 29.471	135 Z	+1 22	+34.76	−16.57	+18.19	21	2.0
940	1907, Apr. 22.378	120 Z	+0 43	+41.16	−23.54	+17.62	22	2.4

Mean: +17.96

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\Sigma v^2$
				α Ursae majoris				
				α 10h 57m6, δ +62° 18′ Type XV, Mag. 4.10				
		min.		km	km	km		km
95*	1903, June 27.391	60 K	+5h12m	+ 4.93	−12.03	− 7.10	13	±1.4
95	1903, June 27.391	60K	+5 12	+ 4.65	−12.03	− 7.38	15	1.6
135	1904, Apr. 19.458	45 KZ	+2 20	+ 9.27	−18.57	− 9.30	15	2.9
158	1904, May 19.356	37 K	+1 51	+10.43	−18.53	− 8.10	16	2.0
399	1905, May 11.376	60 Z	+1 47	+13.04	−19.02	− 5.98	16	1.3
670	1906, Apr. 13.413	60 K	+0 49	+11.48	−17.87	− 6.39	17	2.0
					Mean:	− 7.38		
				ψ Ursae majoris				
				α 11h 4m0, δ +45° 3′ Type XV, Mag. 4.59				
131	1904, Apr. 15.501	105 KZ	+3 1	+18.63	−20.42	− 1.79	15	±1.9
146	1904, May 7.420	70 K	+2 30	+20.59	−23.65	− 3.06	15	1.5
401	1905, May 12.374	(110)Z	+1 42	+21.80	−23.89	− 2.09	15	2.4
649	1906, Apr. 6.471	110 Z	+1 40	+15.39	−18.01	− 2.62	22	3.0
					Mean:	− 2.39		
				ν Ursae majoris				
				α 11h 13m1, δ +33° 38′ Type XVI?, Mag. 5.15				
160	1904, May 20.389	124 KZ	+2 27	+18.35	−26.37	− 8.02	11	±1.8
163	1904, June 4.382	105 KZ	+3 16	+19.92	−26.24	− 6.32	14	2.0
938	1907, Apr. 10.467	120 Z	+1 40	+11.86	−18.50	− 6.64	13	1.9
946	1907, May 10.364	120 Z	+1 10	+16.47	−25.36	− 8.89	18	2.8
					Mean:	− 7.47		
				χ Ursae majoris				
				α 11h 40m8, δ +48° 20′ Type XV, Mag. 4.92				
156	1904, May 16.474	114 KZ	+3 46	+16.29	−22.00	− 5.71	15	±3.3
159	1904, May 19.449	106 Z	+3 22	+14.05	−22.09	− 8.04	13	2.4
687	1906, May 29.381	105 Z	+2 22	+13.69	−22.02	− 8.33	15	3.1
					Mean:	− 7.36		
				β Virginis				
				α 11h 45m5, δ +2° 20′ Type XIII*a*, Mag. 4.40				
622	1906, Mar. 26.491	120 Z	+0 42	+ 9.64	− 4.54	+ 5.10	26	±3.2
660	1906, Apr. 9.450	120 Z	+0 39	+16.21	−11.36	+ 4.85	15	2.5
666	1906, Apr. 11.444	105 Z	+0 38	+16.69	−12.29	+ 4.40	15	2.4
684	1906, May 28.371	95 Z	+1 59	+32.99	−27.77	+ 5.22	20	2.5
					Mean:	+ 4.89		
				o Virginis				
				α 12h 0m1, δ +9° 17′ Type XIV, Mag. 5.03				
208	1905, May 3.438	(130)Z	+1 43	− 6.17	−20.97	−27.14	15	±2.9
674	1906, Apr. 15.458	(135)K	+0 59	−16.11	−13.71	−29.82	13	2.5
943	1907, Apr. 24.445	120 Z	+1 16	−10.01	−17.40	−27.41	14	4.2
					Mean:	−28.12		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\Sigma v$
		min.		km	km	km		km
				ε Virginis				
	α 12h 57m2, δ +11° 30′				Type XV, Mag. 4.72			
80*	1903, May 29.385	70 K	+1h10m	+11.50	−24.02	−12.52	15	±2.4
80	1903, May 29.385	70 K	+1 10	+12.86	−24.02	−11.16	15	2.5
143	1904, Apr. 25.436	65 KZ	+0 13	+ 0.95	−12.36	−11.41	16	1.3
150	1904, May 15.377	65 K	+0 6	+ 5.15	−20.08	−14.93	16	2.3
387	1905, Apr. 14.481	90 Z	+0 32	− 5.36	− 7.30	−12.66	16	1.5
535	1905, Dec. 30.754	65 K	+0 11	−41.90	+29.05	−12.85	32	2.1
682	1906, May 23.394	100 Z	+1 1	+10.25	−22.47	−12.22	22	2.9
689	1906, June 6.381	80 Z	+1 37	+13.34	−25.87	−12.53	22	2.0
					Mean:	−12.54		
				η Boötis				
	α 13h 49m9, δ +18° 54′				Type XIV, Mag. 3.79			
72*	1903, May 23.403	60 K	+0 20	+24.86	−17.70	+ 7.16	14	±1.8
72	1903, May 23.403	60 K	+0 20	+25.69	−17.70	+ 7.99	14	1.7
142	1904, Apr. 24.501	75 KZ	+0 50	+ 4.84:	− 7.02	− 2.18:	14	2.1
147	1904, May 7.480	(60)K	+1 10	+ 8.10	−12.35	− 4.25	16	1.8
405	1905, May 28.407	85 Z	+0 47	+15.98	−19.39	− 3.41	16	2.3
568	1906, Jan. 23.735	60 K	+0 26	−19.51	+25.73	+ 6.22	26	1.7
691	1906, June 7.371	65 Z	+0 33	+25.83	−21.90	+ 3.93	26	2.6
					Velocity variable			
				α Boötis				
	α 14h 11m1, δ +19° 42′				Type XV, Mag. bright			
301	1904, Dec. 21.797	21 K	−0 35	−28.43	+24.03	− 4.40	20	±1.3
427	1905, July 7.349	20 K	+1 40	+21.20	−25.02	− 3.82	20	1.9
570	1906, Jan. 23.787	19 K	+1 20	−29.52	+25.46	− 4.06	20	1.4
623	1906, Mar. 27.597	20 K	+0 53	−12.03	+ 7.58	− 4.45	20	2.0
676	1906, Apr. 15.556	23 K	+1 10	− 2.51	− 0.65	− 3.16	20	1.9
964	1907, July 21.345	26 K	+2 27	+21.79	−25.22	− 3.43	20	1.3
					Mean:	− 3.89		
				ρ Boötis				
	α 14h 27m5, δ +30° 49′				Type XV, Mag. 4.98			
406	1905, May 29.481	100 Z	+2 0	+ 4.13	−15.68	−11.55	15	±2.0
416	1905, June 20.442	120 Z	+2 29	+ 8.48	−20.08	−11.60	11	2.8
690	1906, June 6.460	105 Z	+2 0	+ 6.08	−17.50	−11.42	16	1.3
945	1907, May 9.476	120 Z	+0 31	− 2.84	− 9.53	−12.37	15	2.2
					Mean:	−11.74		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				ε Boötis, maj. dpl.				
				α 14h 40m6, δ +27° 30′ Type XV, Mag. bright				
		min.		km	km	km		km
82*	1903, May 31.455	60 K	+1h16m	− 0.86	−15.00	−15.86	14	±3.3
82	1903, May 31.455	60 K	+1 16	+ 0.49	−15.00	−14.51	14	2.2
144	1904, Apr. 25.524	60 KZ	+0 35	− 8.25:	− 3.06	−11.31:	15	1.6
208	1904, June 26.408	62 K	+1 53	+ 5.82	−20.72	−14.90	16	1.5
418	1905, June 22.415	60 K	+1 46	+ 4.34	−20.06	−15.72	14	2.0
625	1906, Mar. 27.661	75 K	+1 56	−25.72	+ 8.04	−17.68	28	1.8
						Velocity variable?		
				β Ursae minoris				
				α 14h 51m0, δ +74° 34′ Type XVI, Mag. 4.09				
105*	1903, July 2.492	75 K	+4 5	+22.27	− 4.62	+17.65	14	±2.9
105	1903, July 2.492	75 K	+4 5	+23.17	− 4.62	+18.55	14	1.7
183	1904, June 13.394	42 KZ	+0 31	+24.14	− 6.57	+17.57	15	2.6
186	1904, June 14.386	60 K	+0 24	+26.29	− 6.48	+19.81	15	1.7
247	1904, Aug. 2.393	63 K	+3 47	+19.50	− 2.81	+16.69	14	2.3
944	1907, May 7.430	(60)Z	−1 6	+28.36	− 8.60	+19.76	17	2.4
						Mean: +18.34		
				β Boötis				
				α 14h 58m2, δ +40° 47′ Type XIV, Mag. 4.56				
71*	1903, May 22.516	90 K	+1 51	−10.42	−10.49	−20.91	14	±2.3
71	1903, May 22.516	90 K	+1 51	− 9.18	−10.49	−19.67	11	2.9
109*	1903, July 15.447	90 K	+3 44	− 2.21	−17.33	−19.54	14	2.6
109	1903, July 15.447	90 K	+3 44	− 1.69	−17.33	−19.02	12	3.0
692	1906, June 7.442	95 Z	+1 8	− 5.89	−13.74	−19.63	17	3.6
947	1907, May 10.453	95 Z	−0 27	−10.42	− 7.37	−17.79	17	2.4
						Mean: −19.43		
				δ Boötis				
				α 15h 11m5, δ +33° 42′ Type XV, Mag. 4.72				
74*	1903, May 24.473	80 K	+0 43	− 2.97	− 9.74	−12.71	14	±2.0
74	1903, May 24.473	80 K	+0 43	− 2.64	− 9.74	−12.38	13	3.3
149	1904, May 13.485	(120)Z	+0 18	− 5.99:	− 6.69	−12.68:	15	2.6
949	1907, May 11.451	110 Z	−0 40	− 3.40	− 5.76	− 9.16	18	2.6
						Mean: −11.73		
				ι Draconis				
				α 15h 22m7, δ +59° 19′ Type XV, Mag. 5.02				
196	1904, June 20.405	100 KZ	+0 42	− 1.01	− 9.48	−10.49	17	±3.2
412	1905, June 3.370	50 Z	−1 16	− 0.13	− 8.79	− 8.92	15	1.9
429	1905, July 7.433	85 Z	+2 28	− 1.47	− 9.38	−10.85	15	1.3
952	1907, May 25.392	(85)Z	−1 22	− 0.27	− 8.13	− 8.40	18	2.4
						Mean: − 9.66		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
		min.		km	km	km		km
			α Serpentis					
		α 15h 39m3, δ +6° 44′		Type XV, Mag. 4.23				
78*	1903, May 26.454	60 K	−0h 4m	+ 9.74	− 6.04	+ 3.70	14	±2.0
78	1903, May 26.454	60 K	−0 4	+11.31	− 6.04	+ 5.27	13	1.5
81*	1903, May 30.473	60 K	+0 40	+13.59	− 7.84	+ 5.75	15	1.7
81	1903, May 30.473	60 K	+0 40	+12.12	− 7.84	+ 4.28	14	1.5
213	1904, June 29.410	73 K	+1 9	+23.95	−19.35	+ 4.60	16	2.1
954	1907, June 11.450	75 K	+0 53	+17.39	−12.77	+ 4.62	16	1.9
					Mean:	+ 4.70		
			γ Serpentis					
		α 15h 51m8, δ +16° 0′		Type XIII*a*, Mag. 4.54				
415	1905, June 19.458	(120)Z	+1 26	+22.21	−14.25	+ 7.96	15	±1.9
710	1906, July 16.410	120 KZ	+2 1	+27.76	−21.29	+ 6.47	18	2.1
713	1906, July 17.398	120 KZ	+1 48	+28.34	−21.46	+ 6.88	19	1.7
					Mean:	+ 7.10		
			δ Ophiuchi					
		α 16h 9m1, δ −3° 26′		Type XVII, Mag. 4.53				
956	1907, June 27.440	100 K	+1 12	− 1.33	−15.71	−17.04	17	±2.7
958	1907, July 8.410	125 Z	+1 19	+ 1.51	−19.73	−18.22	13	3.0
960	1907, July 19.369	120 Z	+0 56	+ 5.06	−23.06	−18.00	20	2.3
962	1907, July 20.371	120 Z	+1 4	+ 8.27:	−23.33	−15.06:	10	2.2
					Mean:	−17.08		
			η Draconis					
		α 16h 22m6, δ +61° 44′		Type XIV ?, Mag. bright				
411	1905, May 31.453	60 Z	−0 27	− 7.68	− 4.86	−12.54	16	±1.6
425	1905, July 6.456	65 Z	+1 59	− 7.54	− 5.93	−13.47	16	2.0
448	1905, July 29.385	(90)K	+1 47	− 6.07	− 5.45	−11.52	17	2.4
955	1907, June 27.367	70 K	−0 48	− 8.08	− 5.77	−13.85	24	1.6
					Mean:	−12.84		
			β Herculis					
		α 16h 25m9, δ +21° 42′		Type XV̇, Mag. 4.17				
93*	1903, June 26.383	60 K	−0 30	− 0.76	−12.05	−12.81	14	±2.5
93	1903, June 26.383	60 K	−0 30	+ 0.45	−12.05	−11.60	16	2.5
164	1904, June 4.463	66 KZ	+0 1	−21.18	− 5.09	−26.27	16	2.2
197	1904, June 20.490	70 Z	+1 41	−13.57	−10.62	−24.19	15	2.2
217	1904, July 4.435	67 K	+1 19	− 6.74	−14.68	−21.42	15	2.0
243	1904, July 23.373	40 K	+1 4	+ 1.61	−18.93	−17.32	16	1.9
					Velocity variable			

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
					ζ Herculis			
					α 16h 37m5, δ +31° 47′ Type XIV, Mag. 3.93			
		min.		km	km	km		km
66*	1903, May 21.491	60 K	−0h29m	−73.59	+ 0.36	−73.23	14	±2.2
66	1903, May 21.491	60 K	−0 29	−73.44	+ 0.36	−73.08	16	1.5
83*	1903, May 31.513	60 K	+0 42	−72.43	− 2.71	−75.14	13	1.7
83	1903, May 31.513	60 K	+0 42	−72.12	− 2.71	−74.83	12	2.3
184	1904, June 13.457	60 KZ	+0 15	−65.63	− 6.60	−72.23	16	1.5
238	1904, July 19.378	60 K	+0 44	−56.99	−14.76	−71.75	16	1.9
705	1906, July 2.459	100 Z	+1 31	−60.19	−11.37	−71.56	31	2.2
						Velocity variable		
					η Herculis			
					α 16h 39m5, δ +39° 7′ Type XV, Mag. 4.65			
233	1904, July 15.407	120 KZ	+1 8	+23.04	−12.05	+10.99	14	±2.1
236	1904, July 18.401	102 Z	+1 11	+21.35	−12.45	+ 8.90	13	2.2
443	1905, July 26.399	105 Z	+1 38	+25.22	−13.37	+11.85	28	2.8
967	1907, July 24.402	120 Z	+1 33	+23.71	−13.10	+10 61	20	2.6
						Mean: +10.59		
					κ Ophiuchi			
					α 16h 52m9, δ +9° 32′ Type XV, Mag. 4.56			
187	1904, June 14.470	95 KZ	+0 23	−49.95:	− 5.47	−55.42:	15	±2.7
202	1904, June 21.487	95 KZ	+1 15	−43.89	− 8.36	−52.25	15	1.5
230	1904, July 12.414	104 KZ	+0 53	−37.58	−15.96	−53.54	13	1.7
453	1905, Aug. 3.395	100 Z	+1 51	−31.65	−21.87	−53.52	17	1.9
						Mean: −53.68		
					π Herculis			
					α 17h 11m6, δ +36° 55′ Type XV, Mag. 4.98			
204	1904, June 23.481	96 Z	+0 55	−16.52	− 5.40	−21.92	9	±2.7
211	1904, June 27.484	(100)K	+1 15	−17.20	− 6.35	−23.55	13	3.0
249	1904, Aug. 3.383	93 K	+1 15	−10.83	−13.05	−23.88	14	1.9
959	1907, July 14.436	(110)Z	+1 10	−13.32	− 9.74	−23.06	17	2.8
						Mean: −23.10		
					β Draconis			
					α 17h 28m2, δ +52° 23′ Type XIV, Mag. 4.19			
167	1904, June 6.451	58 KZ	−1 12	−19.62	− 0.56	−20.18	14	±2.3
170	1904, June 7.433	90 KZ	−1 34	−22.35	− 0.67	−23.02	13	2.1
185	1904, June 13.522	62 KZ	+0 59	−18.91	− 1.55	−20.46	15	1.9
244	1904, July 29.390	64 K	+0 49	−13.30	− 6.22	−19.52	16	1.3
965	1907, July 21.453	68 K	+1 46	−14.23	− 5.58	−19.81	18	2.3
						Mean: −20.60		

Plate No.	Date Greenwich M. T.	Expo-sure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
		min.		km	km	km		km
β Ophiuchi								
α 17h 38m5, δ +4° 36′					Type XV, Mag. 4.19			
86*	1903, June 15.491	75 K	+0h10m	−12.00	+ 0.27	−11.73	14	±2.2
86	1903, June 15.491	75 K	+0 10	−11.67	+ 0.27	−11.40	14	2.3
96*	1903, June 27.500	75 K	+1 10	− 4.11	− 5.04	− 9.15	13	2.6
96	1903, June 27.500	75 K	+1 10	− 4.47	− 5.04	− 9.51	14	2.0
165	1904, June 4.531	90 KZ	+0 26	−15.70	+ 4.69	−11.01	15	2.0
240	1904, July 21.392	80 K	+0 12	+ 5.15	−14.83	− 9.68	15	1.5
					Mean:	−10.41		
μ Herculis								
α 17h 42m5, δ +27° 47′					Type XIV, Mag. 4.39			
239	1904, July 19.446	93 Z	+1 18	− 4.51	−10.13	−14.64	16	±2.0
242	1904, July 22.412	94 Z	+0 41	− 3.67	−10.86	−14.53	16	1.8
439	1905, July 20.430	(65)Z	+0 57	− 2.67	−10.30	−12.97	17	2.6
450	1905, July 31.405	90 Z	+1 4	− 2.89	−12.96	−15.85	15	1.7
					Mean:	−14.50		
ξ Draconis								
α 17h 51m8, δ +56° 53′					Type XV, Mag. 5.34			
423	1905, July 3.489	120 Z	+1 5	−24.08	− 1.56	−25.64	12	±1.5
716	1906, July 23.430	120 Z	+0 58	−22.00	− 3.01	−25.01	17	2.9
718	1906, July 25.363	115 K	−0 31	−23.70	− 3.08	−26.78	23	1.9
					Mean:	−25.81		
ξ Herculis								
α 17h 53m9, δ +29° 16′					Type XV, Mag. 4.79			
420	1905, June 23.501	(115)Z	+0 41	+ 2.24	− 1.22	+ 1.02	14	±2.8
433	1905, July 8.503	110 Z	+1 43	+ 4.84	− 5.69	− 0.85	13	1.7
724	1906, July 30.398	120 Z	+0 37	+10.58	−11.29	− 0.71	27	2.1
961	1907, July 19.465	110 Z	+1 29	+ 8.77	− 8.55	+ 0.22	19	1.8
					Mean:	− 0.08		
γ Draconis								
α 17h 54m3, δ +51° 30′					Type XVI, Mag. 4.45			
85*	1903, June 11.494	85 K	−0 17	−28.04	+ 0.95	−27.09	14	±2.2
85	1903, June 11.494	85 K	−0 17	−28.06	+ 0.95	−27.11	13	2.1
168	1904, Jnne 6.503	75 KZ	−0 21	−27.69	+ 1.49	−26.20	15	1.9
171	1904, June 7.497	85 KZ	−0 26	−26.54	+ 1.38	−25.16	16	1.0
245	1904, July 29.445	73 K	+1 43	−21.60	− 4.99	−26.59	15	2.3
					Mean:	−26.43		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
		min.		km	km	km		km
			η Serpentis					
		α 18h 16m1, δ − 2° 56′		Type XV, Mag. 4.62				
220	1904, July 6.468	115 Z	+0h24m	+16.94	− 4.83	+12.11	11	±2.6
228	1904, July 11.460	125 Z	+0 32	+18.28	− 7.10	+11.18	13	1.8
747	1906, Aug. 28.346	115 Z	+0 56	+33.54	−24.21	+ 9.33	14	3.1
963	1907, July 20.468	120 Z	+1 16	+21.34	−10.78	+10.56	12	2.1
					Mean:	+10.80		
			χ Draconis					
		α 18h 22m9, δ +72° 41′		Type XIII*a*, Mag. 4.24				
726	1906, Aug. 2.358	90 Z	−0 38	+13.49	+ 2.71	+16.20	16	±1.8
728	1906, Aug. 6.361	90 Z	−0 17	+12.55	+ 2.84	+15.39	17	1.7
731	1906, Aug. 7.343	80 Z	−0 38	+13.49	+ 2.86	+16.35	21	2.3
772	1906, Sept. 26.285	(80)Z	+1 14	+29.76	+ 3.12	+32.88	14	2.9
974	1907, Aug. 25.362	90 Z	+0 59	+33.43	+ 3.20	+36.63	15	2.1
					Velocity variable			
			δ Draconis					
		α 19h 12m5, δ +67° 29′		Type XV, Mag. 4.69				
232	1904, July 14.449	92 Z	−0 29	+21.33	+ 3.62	+24.95	15	±1.7
234	1904, July 16.413	83 Z	−1 13	+21.35	+ 3.63	+24.98	15	2.6
426	1905, July 6.517	60 Z	+0 37	+21.50	+ 3.61	+25.11	15	2.1
764	1906, Sept. 12.330	80 Z	+0 34	+24.09	+ 1.58	+25.67	20	2.1
					Mean:	+25.18		
			κ Cygni					
		α 19h 14m8, δ +53° 11′		Type XV, Mag. 4.94				
441	1905, July 21.426	115 Z	−0 37	−29.66	+ 2.13	−27.53	16	±1.2
479	1905, Sept. 22.354	105 Z	+1 47	−20.95	− 6.07	−27.02	16	1.5
733	1906, Aug. 8.378	115 Z	−0 37	−27.61	− 0.29	−27.90	26	2.2
786	1906, Oct. 22.261	120 Z	+1 31	−20.42	− 8.15	−28.57	19	2.0
					Mean:	−27.76		
			β Cygni, maj. dpl.					
		α 19h 26m7, δ +27° 45′		Type XV, Mag. 4.31				
103*	1903, July 1.570	90 K	+1 18	−29.48	+ 6.78	−22.70	13	±1.7
103	1903, July 1.570	90 K	+1 18	−29.79	+ 6.78	−23.01	14	1.8
224	1904, July 8.465	82 Z	−0 44	−25.05:	+ 4.55	−20.50:	14	3.8
226	1904, July 10.466	87 Z	−0 35	−27.33	+ 3.91	−23.42	14	1.8
757	1906, Sept. 3.378	85 K	+0 54	−11.25	−12.84	−24.09	15	2.0
					Mean:	−22.74		

Plate No.	Date Greenwich M. T.	Expo-sure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
		min.		km	km	km		km

γ Aquilae

α 19h 41m5, δ +10° 22′ Type XV, Mag. 4.66

97*	1903, June 28.500	75 K	−0h50m	−10.17	+10.08	− 0.09	13	±2.2
97	1903, June 28.500	75 K	−0 50	− 9.91	+10.08	+ 0.17	11	2.5
231	1904, July 12.519	84 Z	+0 36	− 3.85	+ 3.99	+ 0.14	13	2.5
472	1905, Sept. 17.354	90 Z	+1 0	+20.80	−20.95	− 0.15	13	1.9
483	1905, Sept. 28.329	(75)Z	+1 8	+23.14	−23.33	− 0.19	16	2.4
759	1906, Sept. 4.365	100 Z	+0 23	+16.00	−17.10	− 1.10	15	2.3
781	1906, Oct. 10.282	95 Z	+0 46	+22.29	−24.98	− 2.69	15	2.5

Mean: − 0.56

ε Draconis

α 19h 48m5, δ +70° 1′ Type XIV?, Mag. 4.95

430	1905, July 7.516	95 Z	+0 2	− 0.44	+ 5.13	+ 4.69	13	±2.3
719	1906, July 25.460	(110)Z	−0 7	− 2.23	+ 5.34	+ 3.11	18	2.6
723	1906, July 29.442	120 Z	−0 18	− 1.75	+ 5.33	+ 3.58	18	2.6
755	1906, Sept. 1.330	120 Z	−0 44	+ 0.10	+ 4.27	+ 4.37	24	2.2

Mean: + 3.94

β Aquilae

α 19h 50m4, δ +6° 10′ Type XV, Mag. 4.83

444	1905, July 26.491	100 Z	+0 40	−36.10	− 1.20	−37.30	15	±2.2
462	1905, Aug. 17.388	120 Z	−0 21	−26.86	−10.58	−37.44	17	2.2
714	1906, July 17.511	120 Z	+0 32	−43.15	+ 2.89	−40.26	17	2.1
985	1907, Sept. 19.360	125 Z	+1 6	−17.07	−21.91	−38.98	16	2.1

Mean: —38.50

η Cygni

α 19h 52m6, δ +34° 49′ Type XV, Mag. 5.06

458	1905, Aug. 13.407	120 Z	−0 12	−22.38	− 2.82	−25.20	18	±1.7
488	1905, Oct. 16.307	118 Z	+1 36	− 9.17	−16.70	−25.87	16	2.0
732	1906, Aug. 7.458	120 Z	+0 36	−24.99	− 1.06	−26.05	14	3.1
741	1906, Aug. 22.351	120 Z	−0 59	−18.77	− 5.21	−23.98	20	3.0

Mean: −25.27

31 Cygni

α 20h 10m5, δ +44° 26′ Type XV, Mag. 5.16

460	1905, Aug. 14.383	120 Z	−1 1	− 3.24	+ 1.12	− 2.12	16	±2.0
711	1906, July 16.546	(90)Z	+0 59	−16.02:	+ 7.04	− 8.98:	9	3.6
717	1906, July 23.535	115 Z	+1 10	−18.49:	+ 5.69	−12.80:	10	1.6
725	1906, July 30.521	120 Z	+1 18	−16.24	+ 4.28	−11.96	18	2.9

Velocity variable

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
					γ Cygni			
			$\alpha\ 20^h\ 18^m.6,\ \delta + 39°\ 56'$		Type XIII*c*, Mag. 3.16			
		min.		km	km	km		km
92*	1903, June 25.508	75 K	$-1^h\,27^m$	−20.30	+12.34	− 7.96	13	±4.1
92	1903, June 25.508	75 K	−1 27	−19.52	+12.34	− 7.18	14	2.3
235	1904, July 16.485	53 K	−0 35	−12.44	+ 7.82	− 4.62	15	2.2
246	1904, July 29.506	48 K	+0 47	−10.44	+ 4.53	− 5.91	16	3.4
248	1904, Aug. 2.481	35 K	+0 25	− 8.69	+ 3.52	− 5.17	16	3.0
449	1905, July 29.507	(48) K	+0 46	−10.79	+ 4.60	− 6.19	15	3.3
761	1906, Sept. 8.384	55 K	+0 30	− 0.87	− 6.19	− 7.06	27	3.1
						Mean: − 6.30		
					ε Cygni			
			$\alpha\ 20^h\ 42^m.2,\ \delta + 33°\ 36'$		Type XV, Mag. 3.85			
237	1904, July 18.487	53 K	−0 48	−24.13	+ 9.66	−14.47	16	±1.4
274	1904, Oct. 14.411	52 K	+3 10	+ 2.11	−16.21	−14.10	28	2.0
284	1904, Oct. 29.249	52 K	+0 15	+ 3.10	−18.38	−15.28	16	1.0
482	1905, Sept. 24.365	(60)K	+0 44	− 2.50	−11.30	−13.80	26	1.6
498	1905, Nov. 6.250	(60)K	+0 47	+ 6.89	−19.16	−12.27	29	1.9
767	1906, Sept. 23.406	55 K	+1 38	+ 4.88	−11.03	− 6.15	26	2.1
						Velocity variable		
					η Cephei			
			$\alpha\ 20^h\ 43^m.3,\ \delta + 61°\ 27'$		Type XV, Mag. 4.88			
263	1904, Aug. 29.371	100 Z	−0 50	−90.41	+ 4.15	−86.26	16	±1.2
273	1904, Oct. 14.322	93 KZ	+1 1	−82.27	− 3.02	−85.29	15	1.7
275	1904, Oct. 15.262	87 Z	−0 21	−82.89	− 3.12	−86.01	15	1.1
752	1906, Aug. 30.374	92 Z	−0 44	−90.44	+ 4.08	−86.36	18	1.8
						Mean: −85.98		
					ζ Cygni			
			$\alpha\ 21^h\ 8^m.7,\ \delta + 29°\ 49'$		Type XV, Mag. 4.42			
276	1904, Oct. 16.260	92 Z	−0 46	+31.37	−17.01	+14.36	15	±1.5
286	1904, Oct. 30.317	72 K	+1 30	+34.61	−19.92	+14.69	16	1.7
467	1905, Aug. 24.399	100 Z	−0 56	+14.19	+ 0.06	+14.25	19	1.3
758	1906, Sept. 3.456	90 Z	+1 4	+19.34:	− 3.64	+15.70:	20	4.3
						Velocity variable		
					β Aquarii			
			$\alpha\ 21^h\ 26^m.3,\ \delta - 6°\ 1'$		Type XIV, Mag. 4.20			
282	1904, Oct. 28.280	100 Z	+0 13	+34.64	−28.47	+ 6.17	14	±1.0
292	1904, Nov. 15.243	103 Z	+0 29	+36.10	−29.78	+ 6.32	15	1.5
754	1906, Aug. 31.453	100 Z	+0 30	+15.74	− 8.23	+ 7.51	25	2.4
771	1906, Sept. 25.384	100 KZ	+0 29	+25.80	−19.20	+ 6.60	22	2.9
						Mean: + 6.65		

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
			ρ Cygni					
	α 21h 30m2, δ +45° 9′		Type XV, Mag. 5.09					
		min.		km	km	km		km
475	1905, Sept. 18.359	130 Z	−0h37m	+11.85	− 2.15	+ 9.70	15	±2.5
737	1906, Aug. 12.557	125 Z	+1 40	+ 1.83	+ 8.00	+ 9.83	17	2.6
739	1906, Aug. 21.551	(125)Z	+2 7	+ 2.53	+ 5.67	+ 8.20	17	2.5
995	1907, Sept. 25.331	120 Z	−0 51	+13.63	− 3.95	+ 9.68	17	2.5
					Mean:	+ 9.35		
			ε Pegasi					
	α 21h 39m3, δ +9° 25′		Type XV, Mag. 4.41					
280	1904, Oct. 27.345	80 Z	+1 29	+31.24	−25.12	+ 6.12	14	±3.1
285	1904, Oct. 29.314	72 Z	+0 51	+31.33	−25.48	+ 5.85	14	2.1
491	1905, Oct. 20.293	105 Z	−0 15	+30.04	−23.23	+ 6.81	14	2.1
493	1905, Oct. 24.298	100 Z	+0 8	+30.23	−24.27	+ 5.96	12	1.5
1000	1907, Sept. 28.327	90 K	−0 54	+21.15	−15.68	+ 5.47	14	1.8
					Mean:	+ 6.04		
			α Aquarii					
	α 22h 0m6, δ −0° 48′		Type XIV, Mag. 4.35					
297	1904, Nov. 24.233	100 Z	+0 16	+36.53	−29.65	+ 6.88	15	±1.4
520	1905, Dec. 10.203	50 K	+0 34	+34.43	−28.55	+ 5.88	15	1.7
524	1905, Dec. 18.203	106 Z	+1 7	+34.59	−27.17	+ 7.42	16	1.9
787	1906, Oct. 22.364	120 KZ	+1 12	+32.32	−24.86	+ 7.46	16	3.2
					Mean:	+ 6.91		
			ι Pegasi					
	α 22h 2m4, δ +24° 51′		Type XII*a*, Mag. 4.44					
518	1905, Dec. 6.226	80 Z	+0 50	+ 7.27	−25.01	−17.74	18	±1.7
734	1906, Aug. 8.481	105 Z	−0 56	−31.66	+11.12	−20.54	17	2.6
762	1906, Sept. 8.460	100 Z	+0 36	−27.78	− 1.39	−29.17	18	2.0
768	1906, Sept. 24.430	100 Z	+0 56	+44.49	− 7.97	+36.52	16	4.2
979	1907, Sept. 7.496	100 Z	+1 24	+46.84	− 0.92	+45.92	18	2.4
986	1907, Sept. 19.437	(70)Z	+0 46	+29.64	− 5.83	+23.81	10	3.4
987	1907, Sept. 20.444	100 Z	+0 59	+ 3.01	− 6.25	− 3.24	15	2.1
988	1907, Sept. 22.422	100 Z	+0 36	−43.29	− 7.03	−50.32	17	1.9
990	1907, Sept. 23.410	100 Z	+0 23	−41.98	− 7.41	−49.39	16	1.7
994	1907, Sept. 24.405	100 Z	+0 19	−27.55	− 7.81	−35.36	14	2.8
996	1907, Sept. 25.433	90 Z	+1 4	+ 0.85	− 8.28	− 7.43	15	2.5
998	1907, Sept. 26.419	(75)Z	+0 48	+30.15	− 8.65	+21.50	13	2.7
1001	1907, Sept. 28.412	90 Z	+0 45	+51.12	− 9.43	+41.69	11	2.5
					Velocity variable			
			ζ Cephei					
	α 22h 7m4, δ +57° 43′		Type XVI ?, Mag. 5.25					
742	1906, Aug. 22.456	120 Z	−0 42	−26.48	+ 9.73	−16.75	14	±2.4
750	1906, Aug. 29.449	110 Z	−0 26	−24.82	+ 8.43	−16.39	18	2.6
756	1906, Sept. 1.435	120 KZ	−0 34	−24.21	+ 7.84	−16.37	16	2.5
978	1907, Sept. 7.409	120 Z	−0 47	−22.39	+ 6.66	−15.73	16	2.0
					Velocity variable			

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ⊙	Radial Velocity	No. of Lines	$1/m\,\Sigma v$

η Pegasi

α $22^h\,38^m.3$, $\delta + 29°\,42'$ Type XIV, Mag. 4.16

		min.		km	km	km		km
279	1904, Oct. 23.423	80 Z	$+2^h\,7^m$	+24.82	−14.73	+10.09	15	±1.8
294	1904, Nov. 16.307	72 Z	+0 54	+34.38	−21.46	+12.92	14	1.9
306	1904, Dec. 23.256	95 Z	+2 7	+42.61	−24.69	+17.92	15	2.3
776	1906, Oct. 8.413	80 Z	+0 50	+ 9.21	− 8.89	+ 0.32	19	2.4

Velocity variable

μ Pegasi

α $22^h\,45^m.2$, $\delta + 24°\,5'$ Type XV, Mag. 4.73

288	1904, Nov. 10.339	120 Z	+1 10	+37.15	−21.73	+15.42	15	±2.3
298	1904, Dec. 21.233	100 Z	+1 18	+42.96	−26.27	+16.69	14	1.2
763	1906, Sept. 11.480	120 Z	+0 34	+ 9.58	+ 1.70	+11.28	18	2.6
984	1907, Sept. 18.476	118 Z	+0 54	+15.48	− 1.28	+14.20	21	2.1

Velocity variable?

ι Cephei

α $22^h\,46^m.1$, $\delta + 65°\,40'$ Type XV, Mag. 4.95

729	1906, Aug. 6.544	115 Z	−0 17	−25.32	+13.21	−12.11	27	±1.7
753	1906, Aug. 30.465	120 Z	−0 36	−21.57	+11.08	−10.49	26	2.1
765	1906, Sept. 12.420	100 Z	−0 49	−20.58	+ 9.11	−11.47	26	1.8
981	1907, Sept. 10.416	120 Z	−1 4	−19.91	+ 9.49	−10.42	17	3.3

Mean: −11.12

β Pegasi

α $22^h\,58^m.9$, $\delta + 27°\,32'$ Type XVIII, Mag. 4.80

521	1905, Dec. 17.256	95 K	+1 21	+36.45	−25.95	+10.50	20	±2.2
532	1905, Dec. 27.252	100 K	+1 55	+36.32	−25.81	+10.51	18	2.1
775	1906, Oct. 7.439	100 Z	+1 3	+17.83	− 7.36	+10.47	16	2.9
784	1906, Oct. 11.421	120 Z	+0 54	+18.24	− 9.02	+ 9.22	15	3.6

Mean: +10.17

γ Piscium

α $23^h\,12^m.0$, $\delta + 2°\,44'$ Type XV, Mag. 5.03

283	1904, Oct. 28.371	122 KZ	+0 37	+ 8.41	−21.35	−12.94	14	±1.3
514	1905, Dec. 1.290	120 KZ	+0 54	+15.21	−29.50	−14.29	17	2.2
796	1906, Nov. 11.346	130 KZ	+0 54	+11.53	−25.68	−14.15	14	2.0
1003	1907, Oct. 10.408	120 Z	+0 17	−0.03	−13.56	−13.59	14	1.5

Mean: −13.74

Plate No.	Date Greenwich M. T.	Exposure	Hour Angle	Observed Velocity	Red. to ☉	Radial Velocity	No. of Lines	$1/m\,\Sigma v$
				λ *Andromedae*				
				α $23^h\,32^m.7$, δ +45° 55′		Type XV, Mag. 5.00		
		min.		km	km	km		km
780	1906, Oct. 9.398	120 Z	-0^h22^m	+ 7.66	+ 0.16	+ 7.82	18	±3.0
792	1906, Nov. 10.282	120 Z	−1 3	+25.08	−11.21	+13.87	20	2.5
800	1906, Nov. 20.255	120 Z	−1 2	+20.58	−14.27	+ 6.31	19	1.9
816	1906, Dec. 22.248	120 Z	+0 55	+34.87	−20.95	+13.92	20	2.4
						Velocity variable		
				γ Cephei				
				α $23^h\,35^m.2$, δ +77° 4′		Type XV, Mag. 4.87		
506	1905, Nov. 28.247	100 Z	−0 44	−39.57	− 1.69	−41.26	23	±1.6
509	1905, Nov. 30.223	100 Z	−1 10	−39.48	− 2.13	−41.61	16	1.1
766	1906, Sept. 13.480	100 Z	−0 8	−54.28	+11.72	−42.56	16	2.5
782	1906, Oct. 10.387	95 Z	−0 34	−49.29	+ 8.42	−40.87	16	1.9
1002	1907, Oct. 4.407	90 Z	−0 38	−51.39	+ 9.40	−41.99	19	1.7
						Mean: −41.66		

Among these 99 stars there are 15 with previously known variable velocities; there are three others:

δ Tauri, *ε Boötis*, and *μ Pegasi*

of which it is suspected that their velocities vary.

For the remaining 81 stars the mean values for the plates are given above, no plate that was measured having been omitted. A few plates which were taken under especially unfavorable circumstances are designated as uncertain by the symbol : ; but these plates enter with their full value into the mean. The total number of the plates of these 81 stars is 355, and the sum of the squares of the deviations of the separate plates from the mean is computed to be 249.75. From this follows:

$$\text{Probable error of a plate} = 0.6745\sqrt{\frac{249.75}{274}} = \pm 0.64 \text{ km}.$$

This probable error will presumably be somewhat diminished in the definitive discussion, when the relative corrections for the wave-lengths of the star lines, provisionally taken from Rowland's solar lines, are computed. Since the whole series contains in round numbers 7500 complete measures of about 44 different stellar lines, it will be possible to obtain a very sharp determination of the relative wave-lengths of these lines and at the same time of their dependence

on the type. It is to be expected, however, that the above mean of the radial velocities will not be very much altered by these relative corrections to the lines, inasmuch as the mean for each separate star depends upon a large number of different lines.

Perhaps of somewhat more considerable amount will be found the constant correction which is further to be applied to the observed radial velocities, due in the first place to the absolute errors of the wave-lengths for the *Fe* lines and the star lines taken from Kayser and from Rowland; and in the second place to the combined effect of the instrumental and personal errors which come into play in making and in measuring the spectrograms. It is customary to determine this constant correction by control plates of the sun, moon, or larger planets, and to compare the observed radial velocities with those given precisely by theory. I regard this control as by no means valid, inasmuch as the light used in such cases proceeds from a surface and uniformly illuminates the entire area of the collimating lens; while the star's light, with the very small slit-width necessary, illuminates only a diametral strip with a maximum of intensity along the middle line. The path of the rays is therefore decidedly different in the two cases. *An exact test of the observed radial velocities of stars can in my opinion be obtained only by the observation of a source of light of precisely known radial velocity and as similar as possible to a star, under conditions as closely as possible the same in the observation of the star.*

For instruments of great light-power, with which faint stars can be spectrographically observed, the brightest of the minor planets are especially adapted for this purpose, and perhaps also the satellites of *Jupiter*. Otherwise such a starlike source of light could be most readily produced artificially by a heliotrope set at a sufficiently great distance, as such are used in geodetic triangulations. This could not be attempted at Bonn readily, as the photographic refractor does not permit a view toward distant mountains: it would be necessary to reflect the light from the heliotrope by a second large plane mirror at the central tower of the Observatory, a troublesome procedure which did not appear to be above suspicion.

I had further thought of removing the objective of the refractor, and substituting for it in front of the spectrograph a precisely similar

but some twenty times smaller objective, in order to throw upon the slit a stellar image of one of the larger planets. The brightness of this image would be according to computation sufficient for obtaining a good spectrogram with an exposure of from one to two hours. This procedure, however, also seemed somewhat troublesome, since the large objective had to be removed.

Finally in our repeated discussions of the problem, the idea occurred to Mr. Zurhellen whether it would not be possible to photograph with the spectrograph the starlike, isolated luminous mountain peaks on the night side of the moon near the terminator. We at once made the experiment, which was successful. Unfavorable weather and the circumstance that suitable objects are not always to be found at the terminator, have permitted us to make thus far only the following observations. The exposure and the measurement were made in precisely the same manner as for stars, and the spectrograms do not differ in appearance from those of the stars.

SPECTROGRAMS OF ISOLATED PEAKS NEAR THE TERMINATOR OF THE MOON

Plate No.	Date G. M. T.	Exposure	Hour Angle	Observed Velocity	Calculated Velocity	$C-O$	No. of Lines	$1/m \Sigma\nu$
		min.		km	km	km		km
1038	1908, Jan. 15.435	65 Z	$+0^h49^m$	+1.12	+0.63	−0.49	18	+1.7
1042	1908, Feb. 10.269	100 Z	−0 19	+2.80	+1.20	−1.60	21	2.1
1043	1908, Feb. 10.351	75 K	+1 37	+3.54	+1.33	−2.21	19	1.7
1045	1908, Feb. 11.378	80 K	+1 28	+1.18	+1.24	+0.06	16	2.1

Mean: −1.06

We shall continue further this series of plates of the lunar mountains until we obtain a fully established value for $C-O$. We may assume from these few determinations *that the radial velocities of the stars communicated above require a small negative correction amounting to about* -1.0 *km.* The correction, when thus determined, will fully eliminate all instrumental and personal errors of the exposure and the measurement, as well as the errors in the assumption of the wavelengths in the comparison light and that of the stars, so that we obtain the correct absolute radial velocities of the stars.

ROYAL OBSERVATORY, BONN
February 1908