

ROYAL OBSERVATORY, GREENWICH.

SPECTROSCOPIC OBSERVATIONS

MADE AT THE

ROYAL OBSERVATORY, GREENWICH,

1887.

MOTIONS OF STARS IN THE LINE OF SIGHT, INFERRED FROM SPECTROSCOPIC OBSERVATIONS

MEASURES OF DISPLACEMENT OF LINES in the SPECTRA of STARS, MOON, AND SKY as compared with those of TERRESTRIAL ELEMENTS, and CONCLUDED MOTIONS in the LINE of SIGHT, from OBSERVATIONS at the ROYAL OBSERVATORY, GREENWICH, in the Year 1887.

The day specified in the first column is the Civil Day, and the hours and minutes are those of Greenwich Civil Time, commencing at Greenwich Mean Midnight and counting from 0 to 24 hours.

Note.—The motion corresponding to the displacement actually observed may be inferred from the Concluded Motion by adding the Earth's Motion algebraically.

The "Half-prism" Spectroscope was used throughout. Each "Half-prism" is compound, and is composed of a flint "half-prism" (*i.e.*, the half of an isosceles prism, cut by a plane perpendicular to the base,) and a crown prism, cemented on the emergent face so as to form the half of a direct-vision prism. With one such half-prism a dispersion of about $18\frac{1}{2}^\circ$ from A to H, equivalent to that produced by four flint prisms of 60° , is obtained; and with a train of two a dispersion of about 80° , equivalent to that produced by sixteen flint prisms of 60° . One half-prism has been always employed. The dispersions have been inferred from measurements of the distance between b_1 and b_2 as compared with the wave-length measure.

1^{rev.} of the micrometer corresponds with one "half-prism" to 10.4 tenth-metres or 375 miles per second for the b lines, and to 7.91 tenth-metres or 304 miles per second for the F line.

1^{rev.} of the screw for opening the slit corresponds to 0.01 inch, or about $10''$.

The slit lies north and south when the reading of the Position Circle is 6° .

The velocity of light has been taken as 186,660 miles per second, and the distance of the Sun as 92,250,000 miles.

The estimations of displacements have been made by *indirect* comparison with the comparison-line, except where the contrary is expressly stated. The displacement is estimated in terms of the breadth of the comparison-line.

The sign + denotes a displacement towards the red or a motion of recession, — a displacement towards the blue or a motion of approach.

Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Jan. ^d 26. ^h 21. ^m 25	M	Capella	F	^r 0.200	— 0.009	— $\frac{1}{10}$	+ 12.6	— 15.3	— 21.0	Spectrum bright but tremulous. Definition fair. Star-line not very well seen in first observation, probably giving an incorrect result.
21. 35	M	,,	F	0.200	+ 0.081	+ $\frac{1}{8}$	+ 12.6	+ 12.0	+ 15.4	
21. 50	M	,,	F	0.200	+ 0.054	+ $\frac{1}{4}$	+ 12.6	+ 3.8	+ 8.4	
22. 0	M	,,	F	0.200	+ 0.090	+ $\frac{1}{2}$	+ 12.6	+ 14.7	+ 29.5	Spectrum very tremulous. Star-line very ill-defined and difficult to bisect. There was a decided displacement towards the blue.
22. 15	M	β Persei	F	0.200	— 0.248	— 1	+ 16.6	— 91.9	— 100.7	
22. 30	M	,,	F	0.200	— 0.242	— 1	+ 16.6	— 90.1	— 100.7	
22. 55	M	,,	F	0.200	— 0.261	— 1	+ 16.6	— 95.9	— 100.7	Spectrum very tremulous. Star-line very faint.
23. 10	M	,,	F	0.200	— 0.216	— $\frac{2}{3}$	+ 16.6	— 82.2	— 72.7	
23. 35	M	Rigel	F	0.200	+ 0.040	+ $\frac{1}{4}$	+ 12.7	— 0.6	+ 8.3	
23. 50	M	,,	F	0.200	+ 0.139	+ $\frac{1}{2}$	+ 12.7	+ 29.5	+ 29.4	Spectrum very tremulous. Definition bad. Displacement appeared small towards the blue.
27. 0. 15	M	Sirius	F	0.200	— 0.055	— $\frac{1}{4}$	+ 6.0	— 22.7	— 27.0	
0. 25	M	,,	F	0.200	— 0.075	— $\frac{1}{4}$	+ 6.0	— 28.8	— 27.0	
Jan. 28. 19. 35	M	β Persei	F	0.230	— 0.069	— $\frac{1}{2}$	+ 16.8	— 37.8	— 42.2	Spectrum faint, but fairly steady. Definition of star-line poor.
19. 50	M	,,	F	0.230	+ 0.024	+ $\frac{1}{8}$	+ 16.8	— 9.5	+ 3.5	
20. 0	M	,,	F	0.230	+ 0.049	+ $\frac{1}{8}$	+ 16.8	— 1.9	+ 3.5	
20. 10	M	,,	F	0.230	0.000	0	+ 16.8	— 16.8	— 16.8	Spectrum faint. Definition poor. Star-line only occasionally seen well.
20. 30	M	Aldebaran	F	0.230	+ 0.111	+ $\frac{2}{5}$	+ 16.4	+ 17.3	+ 24.2	
20. 45	M	,,	F	0.230	+ 0.134	+ $\frac{1}{2}$	+ 16.4	+ 24.3	+ 34.3	
Jan. 31. 19. 10	M	Moon	F	0.160	+ 0.008			— 2.4		The coincidence of the two spectra appeared perfect.
19. 15	M	,,	F	0.160	+ 0.017			+ 5.1		
19. 20	M	,,	F	0.160	+ 0.008			+ 2.4		
19. 25	M	,,	F	0.160	— 0.011			— 3.3		Spectrum fairly bright and steady. Definition bad. Displacement evidently very slight.
19. 30	M	,,	F	0.160	+ 0.019			+ 5.8		
19. 45	M	β Persei	F	0.160	— 0.023	— $\frac{1}{10}$	+ 17.0	— 24.0	— 21.9	
20. 5	M	,,	F	0.160	— 0.017	— $\frac{1}{10}$	+ 17.0	— 22.1	— 19.4	
20. 25	M	,,	F	0.160	— 0.010	— $\frac{1}{10}$	+ 17.0	— 20.0	— 19.4	
20. 45	M	,,	F	0.160	+ 0.030	+ $\frac{1}{5}$	+ 17.0	— 7.9	— 7.3	
21. 0	M	,,	F	0.160	— 0.003	0	+ 17.0	— 17.9	— 17.0	

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Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Jan. 31. 21. 15 ^{d h m}	M	Rigel	F	0'160	+ 0'123	+ $\frac{1}{2}$	+ 13'5	+ 23'9	+ 10'8	Spectrum bright but tremulous. Definition fair. Spectrum fairly bright and steady. Definition fair. Star-line seen only by glimpses. Position Circle, 6°.
21. 25	M	„	F	0'160	+ 0'123	+ $\frac{1}{2}$	+ 13'5	+ 23'9	+ 10'8	
21. 30	M	γ Orionis	F	0'160	- 0'023	- $\frac{1}{10}$	+ 14'4	- 21'4	- 19'3	
21. 35	M	„	F	0'160	- 0'038	- $\frac{1}{2}$	+ 14'4	- 25'9	- 24'1	
21. 50	M	β Tauri	F	0'160	- 0'040	- $\frac{1}{2}$	+ 14'6	- 26'7	- 24'3	
22. 0	M	„	F	0'160	- 0'025	- $\frac{1}{10}$	+ 14'6	- 22'2	- 19'5	
Feb. 2. 22. 40	M	β Persei	F	0'152	- 0'331	- $1\frac{1}{2}$	+ 17'1	- 117'6	- 122'8	Spectrum faint and tremulous. Star-line not seen well. Direct comparison shewed large displacement towards the blue. The coincidence of the two spectra appeared perfect. Spectrum very tremulous. Star-line seen with great difficulty. Spectrum bright but tremulous. Star-line seen well. Definition fair. Direct comparison seemed to show that the displacement was practically nil, if anything very slight towards the red. Spectrum bright and fairly steady. Definition good. Star-line fairly well seen. Spectrum fairly bright and steady. Star-line fairly well seen. Displacement large towards the blue. Position Circle, 6°.
22. 50	M	„	F	0'152	- 0'246	- 1	+ 17'1	- 91'8	- 87'6	
23. 0	M	„	F	0'152	- 0'326	- $1\frac{1}{4}$	+ 17'1	- 116'1	- 105'2	
23. 10	M	„	F	0'152	- 0'302	- $1\frac{1}{4}$	+ 17'1	- 108'8	- 105'2	
23. 30	M	Moon	F	0'152	+ 0'024			+ 7'3		
23. 33	M	„	F	0'152	+ 0'009			+ 3'5		
23. 36	M	„	F	0'152	- 0'012			- 4'6		
23. 39	M	„	F	0'152	- 0'005			- 1'9		
23. 42	M	„	F	0'152	+ 0'010			+ 3'8		
3. 0. 5	M	Rigel	F	0'152	+ 0'062	+ $\frac{1}{4}$	+ 13'8	+ 5'0	+ 3'8	
0. 15	M	„	F	0'152	+ 0'118	+ $\frac{1}{2}$	+ 13'8	+ 22'0	+ 21'5	Spectrum bright but tremulous. Star-line seen well. Definition fair. Direct comparison seemed to show that the displacement was practically nil, if anything very slight towards the red. Spectrum bright and fairly steady. Definition good. Star-line fairly well seen. Spectrum fairly bright and steady. Star-line fairly well seen. Displacement large towards the blue. Position Circle, 6°.
0. 20	M	Sirius	F	0'152	+ 0'107	+ $\frac{1}{2}$	+ 7'6	+ 24'9	+ 27'7	
0. 25	M	„	F	0'152	+ 0'040	+ $\frac{1}{2}$	+ 7'6	+ 4'5	+ 6'5	
0. 30	M	„	F	0'152	+ 0'105	+ $\frac{1}{2}$	+ 7'6	+ 24'3	+ 20'6	
0. 35	M	„	F	0'152	+ 0'025	+ $\frac{1}{10}$	+ 7'6	0'0	- 0'5	
0. 40	M	„	F	0'152	+ 0'093	+ $\frac{1}{2}$	+ 7'6	+ 20'7	+ 20'6	
0. 45	M	„	F	0'152	+ 0'030	+ $\frac{1}{10}$	+ 7'6	+ 1'5	- 0'5	
0. 50	M	Procyon	F	0'152	+ 0'064	+ $\frac{1}{4}$	+ 6'2	+ 13'2	+ 11'4	
1. 0	M	„	F	0'152	+ 0'110	+ $\frac{1}{2}$	+ 6'2	+ 27'2	+ 29'0	
1. 20	M	Castor	F	0'152	- 0'073	- $\frac{3}{10}$	+ 8'0	- 30'1	- 29'2	
1. 30	M	„	F	0'152	- 0'111	- $\frac{1}{2}$	+ 8'0	- 41'7	- 43'2	Spectrum exceedingly tremulous. Spectrum very tremulous. Star-line very difficult to see. Spectrum fairly steady. Definition fairly good. Position Circle, 6°.
Feb. 12. 21. 0	M	Sirius	F	0'138	+ 0'026	+ $\frac{1}{10}$	+ 9'6	- 1'7	- 2'9	
21. 15	M	„	F	0'138	- 0'005	0	+ 9'6	- 11'5	- 9'6	
21. 30	M	„	F	0'138	- 0'029	- $\frac{1}{10}$	+ 9'6	- 18'4	- 16'3	
21. 40	M	„	F	0'138	- 0'036	- $\frac{1}{10}$	+ 9'6	- 20'5	- 16'3	
22. 0	M	Rigel	F	0'138	+ 0'057	+ $\frac{1}{4}$	+ 15'0	+ 2'3	+ 1'7	
22. 15	M	„	F	0'138	+ 0'048	+ $\frac{1}{4}$	+ 15'0	- 0'4	+ 1'7	
22. 25	M	γ Orionis	F	0'138	+ 0'146	+ $\frac{2}{3}$	+ 16'3	+ 28'0	+ 28'2	
22. 35	M	„	F	0'138	+ 0'134	+ $\frac{2}{3}$	+ 16'3	+ 24'4	+ 23'8	
Feb. 15. 22. 45	M	β Persei	F	0'138	- 0'183	- $\frac{3}{2}$	+ 17'4	- 73'0	- 67'5	Spectrum faint. Star-line faint and dif-fused and seen with difficulty. Definition poor. Spectrum steady and fairly bright, but definition poor. Spectrum fairly bright and steady, but definition poor. Star-line seen with much difficulty. Spectrum bright and fairly steady, but definition poor. Star-line seen with much difficulty. Position Circle, 6°.
22. 50	M	„	F	0'138	- 0'161	- $\frac{3}{2}$	+ 17'4	- 66'3	- 61'9	
23. 0	M	„	F	0'138	- 0'078	- $\frac{1}{2}$	+ 17'4	- 41'1	- 39'7	
23. 10	M	„	F	0'138	- 0'065	- $\frac{1}{2}$	+ 17'4	- 37'1	- 39'7	
23. 15	M	„	F	0'138	- 0'070	- $\frac{1}{2}$	+ 17'4	- 38'7	- 34'1	
23. 20	M	„	F	0'138	- 0'106	- $\frac{1}{2}$	+ 17'4	- 49'6	- 50'8	
23. 35	M	Capella	F	0'138	+ 0'070	+ $\frac{1}{2}$	+ 15'9	+ 5'4	+ 6'4	
23. 50	M	„	F	0'138	+ 0'156	+ $\frac{1}{2}$	+ 15'9	+ 31'5	+ 34'2	
16. 0. 10	M	Castor	F	0'138	+ 0'072	+ $\frac{1}{2}$	+ 11'5	+ 10'4	+ 10'8	
0. 20	M	„	F	0'138	- 0'123	- $\frac{1}{2}$	+ 11'5	- 48'9	- 44'9	
0. 30	M	„	F	0'138	+ 0'038	+ $\frac{1}{2}$	+ 11'5	+ 0'1	+ 1'9	Spectrum bright and fairly steady, but definition poor. Star-line seen with much difficulty. Position Circle, 6°.
0. 40	M	„	F	0'138	- 0'069	- $\frac{1}{2}$	+ 11'5	- 32'5	- 28'2	
0. 55	M	Pollux	F	0'138	- 0'092	- $\frac{1}{2}$	+ 10'8	- 38'8	- 33'1	
1. 10	M	„	F	0'138	- 0'129	- $\frac{1}{2}$	+ 10'8	- 50'0	- 44'2	

MOTIONS OF STARS IN THE LINE OF SIGHT, INFERRED FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887. Greenwich Civil Time	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Feb. 16. 19. 32 ^{d h m}	M	γ Cassiopeiæ...	F	0.138	-0.139	- $\frac{3}{10}$	+ 12.0	- 54.2	- 52.3	The bright F line which was very distinct with the single-prism spectroscope was a very difficult object with the half-prism spectroscope and could not be held steadily. It was a narrow line and seemed to elude bisection. Spectrum not seen well at second observation, seen best at sixth.
19. 39	M	,,	F	0.138	-0.063	- $\frac{1}{10}$	+ 12.0	- 31.1	- 45.6	
19. 40	M	,,	F	0.138	+0.240	+	+ 12.0	+ 60.9	+ 32.7	
19. 41	M	,,	F	0.138	+0.076	+	+ 12.0	+ 11.1	+ 21.6	
19. 43	M	,,	F	0.138	+0.066	+	+ 12.0	+ 8.0	+ 10.4	
19. 45	M	,,	F	0.138	+0.091	+	+ 12.0	+ 15.6	+ 21.6	
20. 0	M	γ Andromedæ.	F	0.138	-0.042	- $\frac{1}{10}$	+ 16.1	- 28.8	- 29.5	Spectrum faint, but fairly steady. Star-line faint and seen with difficulty. Displacement evidently small.
20. 2	M	,,	F	0.138	+0.060	+	+ 16.1	+ 2.1	+ 4.0	
20. 10	M	β Persei	F	0.138	-0.199	- $\frac{3}{10}$	+ 17.4	- 77.8	- 67.7	Spectrum bright and fairly steady, but definition poor. Star-line seen best in last observation.
20. 12	M	,,	F	0.138	-0.179	- $\frac{3}{10}$	+ 17.4	- 71.8	- 67.7	
20. 14	M	,,	F	0.138	-0.099	- $\frac{1}{10}$	+ 17.4	- 47.5	- 51.0	
20. 16	M	,,	F	0.138	-0.068	- $\frac{1}{10}$	+ 17.4	- 38.0	- 34.2	
20. 18	M	,,	F	0.138	+0.044	+	+ 17.4	- 4.0	- 0.6	
20. 20	M	,,	F	0.138	-0.024	- $\frac{1}{10}$	+ 17.4	- 24.7	- 24.1	
20. 27	M	α Persei	F	0.138	+0.076	+	+ 16.3	+ 6.8	+ 17.3	Star-line of the Procyon type. The central line was not seen well, although the spectrum was bright and fairly steady.
20. 30	M	,,	F	0.138	0.000	0	+ 16.3	- 16.3	- 16.3	
20. 33	M	,,	F	0.138	-0.012	- $\frac{1}{10}$	+ 16.3	- 19.9	- 23.0	
20. 35	M	,,	F	0.138	-0.013	- $\frac{1}{10}$	+ 16.3	- 20.3	- 23.0	
20. 43	M	Aldebaran	F	0.138	+0.149	+	+ 18.4	+ 26.9	+ 31.9	
20. 48	M	,,	F	0.138	+0.136	+	+ 18.4	+ 22.9	+ 26.3	
20. 53	M	Rigel	F	0.138	+0.057	+	+ 15.4	+ 1.9	+ 7.0	Spectrum bright, but very tremulous. Star-line faint. Definition poor.
20. 55	M	,,	F	0.138	+0.012	+	+ 15.4	- 11.8	- 8.7	
21. 10	M	δ Orionis	F	0.138	+0.040	+	+ 15.8	- 3.7	- 2.4	
21. 12	M	,,	F	0.138	+0.118	+	+ 15.8	+ 20.0	+ 17.8	
21. 21	M	,,	F	0.138	+0.114	+	+ 15.8	+ 18.8	+ 17.8	
21. 22	M	,,	F	0.138	+0.087	+	+ 15.8	+ 10.6	+ 17.8	
21. 29	M	ϵ Orionis	F	0.138	+0.162	+	+ 15.6	+ 33.6	+ 34.7	Spectrum fairly bright, but tremulous. Star-line narrow and fairly dark.
21. 31	M	,,	F	0.138	+0.051	+	+ 15.6	- 0.1	+ 1.2	
21. 37	M	ζ Orionis	F	0.138	-0.109	- $\frac{1}{10}$	+ 15.4	- 48.5	- 37.8	
21. 40	M	,,	F	0.138	+0.038	+	+ 15.4	- 3.8	+ 1.4	
21. 41	M	,,	F	0.138	-0.002	0	+ 15.4	- 16.0	- 15.4	
21. 43	M	,,	F	0.138	-0.035	- $\frac{1}{10}$	+ 15.4	- 26.0	- 28.8	
21. 50	M	γ Orionis	F	0.138	+0.017	+	+ 16.8	- 11.7	0.0	Spectrum bright and somewhat tremulous. Star-line fairly dark.
21. 51	M	,,	F	0.138	-0.050	- $\frac{1}{10}$	+ 16.8	- 32.0	- 33.6	
21. 52	M	,,	F	0.138	+0.105	+	+ 16.8	+ 15.1	+ 5.6	
21. 54	M	,,	F	0.138	-0.017	- $\frac{1}{10}$	+ 16.8	- 21.9	- 23.5	
22. 2	M	β Tauri	F	0.138	+0.042	+	+ 17.2	- 4.5	- 10.5	
22. 4	M	,,	F	0.138	+0.006	+	+ 17.2	- 15.4	- 10.5	
22. 19	M	κ Orionis	F	0.138	-0.104	- $\frac{1}{10}$	+ 14.1	- 45.7	- 36.5	Spectrum faint and tremulous. Star-line faint and seen with much difficulty.
22. 21	M	,,	F	0.138	+0.010	0	+ 14.1	- 11.1	- 14.1	
22. 27	M	γ Geminorum .	F	0.138	-0.291	-1	+ 14.4	- 102.8	- 81.5	
22. 29	M	,,	F	0.138	-0.106	- $\frac{1}{10}$	+ 14.4	- 46.6	- 48.0	
22. 37	M	Sirius	F	0.138	+0.052	+	+ 10.3	+ 5.5	+ 12.1	
22. 38	M	,,	F	0.138	+0.100	+	+ 10.3	+ 20.1	+ 23.3	
22. 40	M	,,	F	0.138	-0.067	- $\frac{1}{10}$	+ 10.3	- 30.7	- 27.1	Spectrum very bright, but exceedingly tremulous.
22. 42	M	,,	F	0.138	-0.059	- $\frac{1}{10}$	+ 10.3	- 28.2	- 32.7	
22. 44	M	,,	F	0.138	+0.125	+	+ 10.3	+ 27.7	+ 23.3	
22. 45	M	,,	F	0.138	-0.082	- $\frac{1}{10}$	+ 10.3	- 35.2	- 43.9	
22. 57	M	Procyon.....	F	0.138	-0.011	0	+ 10.0	- 13.3	- 10.0	
22. 58	M	,,	F	0.138	-0.008	0	+ 10.0	- 12.4	- 10.0	
23. 0	M	,,	F	0.138	+0.031	+	+ 10.0	- 0.6	+ 6.8	Spectrum bright, but very tremulous. Star-line narrow but faint.
23. 1	M	,,	F	0.138	-0.021	- $\frac{1}{10}$	+ 10.0	- 16.4	- 16.7	
Position Circle, 6°.										
Feb. 17. 12. 0	M	Sky.....	F	0.138						Sky spectrum was compared with that of hydrogen. No want of coincidence could be detected. Position Circle, 6°.

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					Measured.	Estimated.		Measured.	Estimated.	
July 4. 22. 25 22. 45	M	Areturus	F	0'167	-0'088	- $\frac{1}{8}$	+ 15'0	- 41'7	- 48'4	Spectrum tremulous and rather faint. Star-line not well seen. Observation made with difficulty. Position Circle, 6°.
	M	,,	F	0'167	-0'098	- $\frac{1}{8}$	+ 15'0	- 44'8	- 41'7	
July 11. 22. 15 23. 0 23. 15 23. 30 23. 45 23. 55 12. 0. 10 0. 20 0. 45 0. 55 1. 15 1. 18 1. 21 1. 24 1. 27	M	Areturus	F	0'160	-0'107	- $\frac{1}{10}$	+ 15'2	- 47'7	- 47'7	Definition poor, although the spectrum was bright.
	M	,,	F	0'160	-0'078	- $\frac{1}{10}$	+ 15'2	- 38'9	- 41'2	
	M	α Coronæ	F	0'160	+0'108	+	+ 11'8	+ 21'0	+ 20'7	Spectrum somewhat faint and unsteady.
	M	,,	F	0'160	+0'106	+	+ 11'8	+ 20'4	+ 20'7	
	M	α Ophiuchi ...	F	0'160	-0'073	- $\frac{1}{10}$	+ 6'9	- 29'1	- 28'6	Spectrum tremulous and somewhat faint. Definition poor.
	M	,,	F	0'160	-0'023	- $\frac{1}{10}$	+ 6'9	- 13'9	- 13'4	
	M	α Lyræ	F	0'160	-0'092	- $\frac{1}{10}$	+ 0'8	- 28'8	- 33'3	Spectrum bright. Star-line fairly well seen.
	M	,,	F	0'160	-0'153	- $\frac{1}{10}$	+ 0'8	- 47'3	- 49'6	
	M	α Aquilæ	F	0'160	-0'139	- $\frac{1}{10}$	- 2'9	- 39'3	- 40'4	Spectrum bright and fairly steady. Star- line fairly well seen.
	M	,,	F	0'160	-0'142	- $\frac{1}{10}$	- 2'9	- 40'2	- 40'4	
	M	Moon	F	0'160	+0'017	- $\frac{1}{10}$		+ 5'1		No want of coincidence could be perceived. Moon spectrum rather faint.
	M	,,	F	0'160	-0'025	- $\frac{1}{10}$		- 7'6		
	M	,,	F	0'160	+0'003	- $\frac{1}{10}$		+ 0'9		Position Circle, 6°.
	M	,,	F	0'160	-0'006	- $\frac{1}{10}$		- 1'8		
	M	,,	F	0'160	+0'012	- $\frac{1}{10}$		+ 3'6		
Aug. 22. 22. 31 22. 46 22. 56 23. 11 23. 31 23. 46 23. 0. 1 0. 11 0. 26 0. 36 1. 11 1. 31	M	α Lyræ	F	0'135	-0'146	- $\frac{1}{10}$	+ 6'1	- 50'5	- 55'5	Spectrum bright and steady. Definition good.
	M	,,	F	0'135	-0'169	- $\frac{1}{10}$	+ 6'1	- 57'4	- 55'5	
	M	γ Lyræ	F	0'135	-0'133	- $\frac{1}{10}$	+ 6'5	- 46'9	- 47'6	Spectrum faint. Star-line seen with much difficulty. Measures rough.
	M	,,	F	0'135	-0'201	- $\frac{1}{10}$	+ 6'5	- 67'6	- 55'9	
	M	ζ Aquilæ	F	0'135	-0'028	- $\frac{1}{10}$	+ 9'6	- 18'1	- 17'8	Spectrum very faint. Star-line seen with great difficulty. Measures rough.
	M	,,	F	0'135	-0'087	- $\frac{1}{10}$	+ 9'6	- 36'0	- 37'0	
	M	α Aquilæ	F	0'135	-0'105	- $\frac{1}{10}$	+ 7'7	- 39'6	- 40'6	Spectrum bright. Star-line somewhat faint.
	M	,,	F	0'135	-0'195	- $\frac{1}{10}$	+ 7'7	- 66'9	- 73'6	
	M	α Cygni	F	0'135	-0'127	- $\frac{1}{10}$	- 0'7	- 37'9	- 40'4	Spectrum bright and steady. Definition good.
	M	,,	F	0'135	-0'161	- $\frac{1}{10}$	- 0'7	- 48'2	- 48'7	
	M	α Cephei	F	0'135	-0'123	- $\frac{1}{10}$	- 4'3	- 33'1	- 36'8	Spectrum fairly bright. Star-line seen fairly well.
	M	,,	F	0'135	-0'218	- $\frac{1}{10}$	- 4'3	- 61'9	- 57'4	
Aug. 24. 21. 23 21. 53 22. 18 22. 43 23. 8 23. 28 23. 58 25. 0. 13	M	α Coronæ Bor.	F	0'090	-0'064	- $\frac{1}{10}$	+ 12'1	- 31'5	- 30'8	Spectrum faint. Measures made with extreme difficulty.
	M	,,	F	0'090	-0'073	- $\frac{1}{10}$	+ 12'1	- 34'3	- 30'8	
	M	α Ophiuchi ...	F	0'090	-0'091	- $\frac{1}{10}$	+ 13'7	- 41'3	- 34'4	Spectrum faint. Star-line not well seen.
	M	,,	F	0'090	-0'106	- $\frac{1}{10}$	+ 13'7	- 45'9	- 34'4	
	M	α Lyræ	F	0'090	-0'189	- $\frac{1}{10}$	+ 6'3	- 63'7	- 47'8	Spectrum bright, but star-line ill-defined and very difficult to bisect.
	M	,,	F	0'090	-0'185	- $\frac{1}{10}$	+ 6'3	- 62'5	- 47'8	
	M	α Aquilæ	F	0'090	-0'132	- $\frac{1}{10}$	+ 8'1	- 48'2	- 39'2	Spectrum fairly bright. Star-line difficult to bisect.
	M	,,	F	0'090	-0'146	- $\frac{1}{10}$	+ 8'1	- 52'5	- 39'2	
	M	,,	F	0'090	-0'146	- $\frac{1}{10}$	+ 8'1	- 52'5	- 39'2	Position Circle, 6°.
Aug. 31. 22. 35 22. 38 22. 47 22. 56 23. 10 23. 14 23. 18 23. 22 23. 27 23. 33 23. 40 23. 43 23. 46 23. 49 23. 52	M	α Lyræ	F	0'163	-0'189	- $\frac{1}{10}$	+ 6'9	- 64'3	- 63'2	Spectrum unsteady and definition poor.
	M	,,	F	0'163	-0'112	- $\frac{1}{10}$	+ 6'9	- 40'9	- 63'2	
	M	,,	F	0'163	-0'128	- $\frac{1}{10}$	+ 6'9	- 45'8	- 49'1	Spectrum faint for so bright a star.
	M	,,	F	0'163	-0'155	- $\frac{1}{10}$	+ 6'9	- 54'0	- 57'5	
	M	α Aquilæ	F	0'163	-0'262	- $\frac{1}{10}$	+ 9'7	- 89'2	- 73'0	Spectrum and star-line seen a little better than in first two measures.
	M	,,	F	0'163	-0'105	- $\frac{1}{10}$	+ 9'7	- 41'6	- 60'3	
	M	,,	F	0'163	-0'230	- $\frac{1}{10}$	+ 9'7	- 79'5	- 60'3	Spectrum fairly bright and steady, but star-line very ill-defined.
	M	,,	F	0'163	-0'211	- $\frac{1}{10}$	+ 9'7	- 73'8	- 60'3	
	M	α Cygni	F	0'163	-0'139	- $\frac{1}{10}$	+ 0'7	- 42'9	- 42'9	Spectrum fairly steady and star-line fairly well defined.
	M	,,	F	0'163	-0'169	- $\frac{1}{10}$	+ 0'7	- 52'0	- 51'3	
	M	Moon	F	0'163	-0'022	- $\frac{1}{10}$		- 6'7		The coincidence of the two spectra appeared perfect.
	M	,,	F	0'163	+0'018	- $\frac{1}{10}$		+ 5'5		
	M	,,	F	0'163	+0'017	- $\frac{1}{10}$		+ 5'1		
	M	,,	F	0'163	+0'017	- $\frac{1}{10}$		+ 5'1		
	M	,,	F	0'163	-0'017	- $\frac{1}{10}$		- 5'1		

MOTIONS OF STARS IN THE LINE OF SIGHT, INFERRED FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Sept. 1. ^{d h m} 0. 0 0. 2 0. 4 0. 6 0. 10 0. 13 0. 16 0. 19 0. 25 0. 30	M M M M M M M M M M	α Pegasi..... ,, ,, ,, γ Pegasi..... ,, ,, ,, α Andromedæ. ,,	F F F F F F F F F F	0.163 0.163 0.163 0.163 0.163 0.163 0.163 0.163 0.163 0.163	-0.137 -0.069 -0.113 -0.075 -0.139 -0.129 -0.061 -0.085 -0.076 -0.136	$-\frac{1}{2}$ $-\frac{1}{4}$ $-\frac{3}{8}$ $-\frac{1}{4}$ $-\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{2}$ $-\frac{1}{2}$	- 4.0 - 4.0 - 4.0 - 4.0 - 8.7 - 8.7 - 8.7 - 8.7 - 9.2 - 9.2	- 37.6 - 17.0 - 30.3 - 18.8 - 33.5 - 30.5 - 9.8 - 17.1 - 13.9 - 32.1	- 38.2 - 17.1 - 46.6 - 17.1 - 19.4 - 33.5 - 19.4 - 19.4 - 18.9 - 33.0	Spectrum faint; star-line ill-defined, measures rough. Spectrum faint but steady. Definition fair. Spectrum fairly bright and steady. Star-line ill-defined. Position Circle, 6°.
Sept. 2. ^{d h m} 21. 3 21. 23	M M	α Lyræ ,,	F F	0.163 0.163	-0.155 -0.109	$-\frac{3}{8}$ $-\frac{3}{8}$	+ 7.1 + 7.1	- 54.2 - 40.2	- 57.7 - 40.9	Spectrum bright and steady. Definition good. Position Circle, 6°.
Oct. 10. ^{d h m} 20. 53 20. 58 21. 8 21. 13 21. 43 21. 52 22. 0 22. 10	M M M M M M M M	α Lyræ ,, α Aquilæ ,, δ Cygni ,, ,, ,,	F F F F F F F F	0.460 0.460 0.460 0.460 0.460 0.460 0.460 0.460	-0.208 -0.101 -0.012 +0.026 +0.165 -0.185 -0.131 -0.086	$-\frac{1}{2}$ $-\frac{1}{2}$ 0 0 $+\frac{1}{4}$ $-\frac{1}{4}$ $-\frac{1}{4}$ $-\frac{1}{8}$	+ 8.7 + 8.7 + 15.7 + 15.7 + 7.1 + 7.1 + 7.1 + 7.1	- 71.9 - 39.3 - 19.3 - 7.8 + 43.0 - 63.3 - 46.9 - 33.2	- 64.5 - 50.5 - 15.7 - 15.7 + 34.7 - 48.9 - 48.9 - 40.5	Definition fair. Spectrum bright and steady. Star-line seen very well. Spectrum faint. Star-line seen with some difficulty. Position Circle, 6°.
Oct. 11. ^{d h m} 12. 13 12. 16 12. 19 12. 22 12. 25	M M M M M	Sky..... ,, ,, ,, ,,	F F F F F	0.460 0.460 0.460 0.460 0.460	-0.030 +0.038 +0.042 +0.016 +0.021			- 9.1 + 11.5 + 12.7 + 4.8 + 6.4		No want of coincidence could be detected, but the sky spectrum and also the hydrogen spectrum were faint and not well seen. Position Circle, 6°.
Oct. 14. ^{d h m} 20. 17 20. 27 20. 47 20. 51 20. 55 20. 59 21. 7 21. 11 21. 19 21. 23 21. 37 21. 43 21. 51 21. 55 22. 5 22. 9 22. 47 22. 57 23. 12 23. 25 23. 45 15. 0. 5 0. 40 0. 55	M M	α Lyræ ,, α Aquilæ ,, γ Cygni ,, α Cygni ,, ϵ Cygni ,, α Cephei ,, ϵ Pegasi ,, α Pegasi ,, α Andromedæ. ,, γ Pegasi ,, α Arietis ,, Aldebaran..... ,,	F F	0.200 0.200	-0.154 -0.074 +0.014 -0.020 -0.079 -0.060 -0.118 -0.094 -0.015 +0.071 -0.190 -0.201 +0.138 +0.124 0.000 +0.019 +0.003 -0.025 -0.028 -0.114 -0.013 -0.021 +0.115 +0.109	$-\frac{2}{3}$ $-\frac{1}{3}$ $+\frac{1}{10}$ $-\frac{1}{4}$ $-\frac{1}{2}$ $-\frac{1}{4}$ $-\frac{1}{3}$ $-\frac{1}{4}$ 0 $+\frac{1}{4}$ $-\frac{1}{4}$ $-\frac{1}{2}$ $+\frac{1}{3}$ $+\frac{1}{2}$ 0 $+\frac{1}{10}$ 0 $-\frac{1}{10}$ $-\frac{1}{10}$ $-\frac{1}{2}$ $-\frac{1}{10}$ $+\frac{2}{3}$ $+\frac{1}{3}$	+ 8.7 + 8.7 + 15.9 + 15.9 + 8.5 + 8.5 + 6.8 + 6.8 + 9.9 + 9.9 + 1.2 + 1.2 + 13.3 + 13.3 + 8.5 + 8.5 + 2.5 + 2.5 + 4.3 + 4.3 - 4.7 - 4.7 - 13.5 - 13.5	- 55.5 - 31.2 - 11.7 - 22.0 - 32.5 - 26.7 - 42.6 - 35.4 - 14.4 + 11.6 - 58.9 - 62.2 + 28.6 + 24.3 - 8.5 - 2.7 - 1.6 - 10.1 - 12.8 - 38.9 + 0.8 - 1.7 + 48.4 + 46.6	- 52.2 - 30.5 - 6.8 - 38.7 - 39.0 - 31.3 - 37.3 - 29.6 - 9.9 + 12.9 - 69.7 - 46.9 + 32.4 + 32.4 - 8.5 + 0.6 - 2.5 - 11.6 - 13.4 - 40.9 - 4.4 - 4.4 + 50.1 + 44.0	Spectrum not very bright. Star-line bisected with some difficulty. Spectrum rather faint, but star-line seen fairly well. Spectrum and star-line faint. Star-line seen fairly well at time of bisection. Spectrum faint but steady. Star-line distinct and steady. Spectrum faint. Star-line seen with extreme difficulty. Spectrum faint. Star-line broad, dark, and diffused at edges. Spectrum faint. Star-line faint but sharp. Seen with some difficulty. Spectrum faint. Star-line broad and diffused, but dark. Spectrum rather faint but steady. Star-line seen fairly well. Spectrum faint. Star-line diffused. Measures made with great difficulty. Spectrum faint. Star-line seen with extreme difficulty. Spectrum somewhat faint. Star-line seen with much difficulty. Position Circle, 6°.

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Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Oct. 19. 20. 2	M	α Pegasi	F	0.200	-0.053	- $\frac{1}{3}$	+ 9.8	- 25.9	- 28.1	Spectrum faint but steady. Star-line dark.
20. 17	M	,,	F	0.200	-0.032	- $\frac{1}{10}$	+ 9.8	- 19.5	- 18.9	Definition fair.
20. 37	M	α Andromedæ.	F	0.200	-0.085	- $\frac{1}{10}$	+ 3.9	- 29.7	- 31.3	Spectrum faint but steady. Star-line
20. 52	M	,,	F	0.200	-0.061	- $\frac{1}{5}$	+ 3.9	- 22.4	- 22.2	rather faint. Definition fair.
21. 7	M	γ Pegasi	F	0.200	-0.009	0	+ 5.7	- 8.4	- 5.7	Spectrum faint but steady, and star-line
21. 22	M	,,	F	0.200	-0.089	- $\frac{1}{2}$	+ 5.7	- 32.7	- 36.2	seen only occasionally.
21. 47	M	β Cassiopeiæ ...	F	0.200	+0.103	+	- 1.5	+ 32.8	+ 32.0	Observations made with very great diffi-
22. 7	M	,,	F	0.200	-0.061	- $\frac{1}{5}$	- 1.5	- 17.0	- 16.8	culty. Spectrum faint but steady. Star-
										line, broad, faint, and diffused. Mea-
										sures rough.
22. 32	M	α Cassiopeiæ...	F	0.200	+0.042	+ $\frac{1}{10}$	- 2.2	+ 14.9	+ 11.3	Spectrum faint but steady. Observations
22. 47	M	,,	F	0.200	+0.035	+ $\frac{1}{10}$	- 2.2	+ 12.8	+ 11.3	made with extreme difficulty.
23. 7	M	γ Cassiopeiæ...	F	0.200	-0.047	- $\frac{1}{5}$	- 3.4	- 10.8	- 14.9	Spectrum steady, but rather faint. The
23. 17	M	,,	F	0.200	-0.088	- $\frac{1}{3}$	- 3.4	- 23.3	- 27.1	hydrogen line in the star was distinctly
										a bright line, but not much brighter
										than the spectrum. It appeared broader
										and more diffused than usual.
23. 37	M	β Persei.....	F	0.200	-0.196	- $\frac{2}{3}$	- 8.1	- 51.4	- 52.8	Spectrum steady and fairly bright. Star-
23. 42	M	,,	F	0.200	-0.214	- $\frac{2}{3}$	- 8.1	- 56.9	- 52.8	line seen fairly well.
23. 47	M	,,	F	0.200	-0.193	- $\frac{2}{3}$	- 8.1	- 49.9	- 52.8	
23. 57	M	,,	F	0.200	-0.183	- $\frac{2}{3}$	- 8.1	- 47.5	- 52.8	
20. 0. 7	M	α Persei	F	0.200	-0.127	- $\frac{2}{3}$	- 9.0	- 29.6	- 27.6	Spectrum steady and fairly bright. Star-
0. 17	M	,,	F	0.200	-0.109	- $\frac{2}{3}$	- 9.0	- 24.1	- 27.6	line seen fairly well.
0. 27	M	Aldebaran ...	F	0.200	+0.121	+	- 12.4	+ 49.1	+ 49.0	Spectrum rather tremulous. Star-line not
0. 32	M	,,	F	0.200	+0.059	+	- 12.4	+ 30.3	+ 30.7	seen well and only by glimpses. Defi-
0. 37	M	,,	F	0.200	+0.169	+	- 12.4	+ 63.7	+ 67.2	nition poor.
0. 57	M	Rigel	F	0.200	+0.098	+	- 12.0	+ 41.8	+ 42.5	Spectrum tremulous. Definition poor.
1. 12	M	,,	F	0.200	+0.036	+	- 12.0	+ 22.9	+ 30.3	Star-line not well seen.
										Position Circle, 6°.
Oct. 21. 21. 35	M	α Andromedæ	F	0.200	-0.008	0	+ 4.5	- 6.9	- 4.5	Spectrum fairly bright and steady for
21. 45	M	,,	F	0.200	-0.151	- $\frac{1}{3}$	+ 4.5	- 50.3	- 50.2	the last two observations. The spectrum
21. 50	M	,,	F	0.200	-0.035	- $\frac{1}{10}$	+ 4.5	- 15.1	- 13.6	was faint for the first two observations.
22. 0	M	,,	F	0.200	-0.066	- $\frac{1}{10}$	+ 4.5	- 24.5	- 31.9	
22. 10	M	β Arietis	F	0.200	+0.151	+	- 1.4	+ 47.2	+ 47.1	Spectrum faint, but star-line dark and
22. 15	M	,,	F	0.200	+0.161	+	- 1.4	+ 50.3	+ 56.2	seen fairly well.
22. 24	M	α Arietis	F	0.200	-0.092	-	- 2.6	- 25.3	- 27.9	Spectrum somewhat faint. Star-line ex-
22. 27	M	,,	F	0.200	+0.155	+	- 2.6	+ 49.7	+ 57.4	ceedingly faint and only seen by
22. 30	M	,,	F	0.200	+0.085	+	- 2.6	+ 28.4	+ 39.2	glimpses. Measures very rough.
22. 33	M	,,	F	0.200	+0.081	+	- 2.6	+ 27.2	+ 33.1	
22. 40	M	β Persei.....	F	0.200	-0.378	- 1	- 7.6	- 107.2	- 83.7	Spectrum bright and steady. Star-line
22. 44	M	,,	F	0.200	-0.299	- $\frac{2}{3}$	- 7.6	- 83.2	- 60.9	seen very well. Displacement evidently
22. 48	M	,,	F	0.200	-0.293	- $\frac{2}{3}$	- 7.6	- 81.4	- 60.9	large towards the blue.
22. 52	M	,,	F	0.200	-0.201	-	- 7.6	- 53.4	- 47.2	
23. 10	M	α Persei	F	0.200	-0.156	-	- 8.6	- 38.7	- 46.2	Spectrum bright, but rather tremulous.
23. 20	M	,,	F	0.200	-0.267	- $\frac{1}{4}$	- 8.6	- 72.5	- 59.9	Star-line somewhat difficult to hold.
										Definition variable.
23. 25	M	Capella	F	0.200	+0.094	+ $\frac{2}{3}$	- 13.5	+ 42.0	+ 50.1	Spectrum bright and steady. Star-line
23. 28	M	,,	F	0.200	+0.214	+	- 13.5	+ 78.5	+ 74.4	seen fairly well.
23. 31	M	,,	F	0.200	+0.049	+ $\frac{1}{4}$	- 13.5	+ 28.4	+ 36.3	
23. 35	M	,,	F	0.200	+0.154	+	- 13.5	+ 60.3	+ 50.1	
23. 40	M	β Aurigæ	F	0.200	+0.046	+	- 15.0	+ 28.9	+ 37.8	Spectrum bright and steady. Star-line
23. 45	M	,,	F	0.200	+0.127	+	- 15.0	+ 53.6	+ 45.5	seen fairly well.
23. 50	M	β Tauri.....	F	0.200	-0.058	- $\frac{1}{10}$	- 14.7	- 2.9	+ 5.6	Spectrum fairly bright and steady. Star-
23. 54	M	,,	F	0.200	-0.192	- $\frac{1}{5}$	- 14.7	- 43.6	- 31.0	line seen fairly well occasionally, es-
23. 58	M	,,	F	0.200	-0.063	- $\frac{1}{10}$	- 14.7	- 4.4	- 8.1	pecially during the third observation.
22. 0. 3	M	,,	F	0.200	-0.139	- $\frac{1}{3}$	- 14.7	- 27.5	- 15.8	Not seen well at the second.
0. 7	M	γ Orionis	F	0.200	-0.029	- $\frac{1}{10}$	- 13.8	+ 5.0	+ 4.7	Spectrum fairly bright and steady. Defi-
0. 10	M	,,	F	0.200	-0.005	0	- 13.8	+ 12.3	+ 13.8	nition good. Star-line well seen.
0. 13	M	Rigel	F	0.200	-0.012	0	- 11.6	+ 8.0	+ 11.6	Spectrum bright but tremulous. Star-
0. 16	M	,,	F	0.200	-0.077	- $\frac{1}{4}$	- 11.6	+ 11.8	+ 11.2	line never held steadily for long. Seen
0. 18	M	,,	F	0.200	+0.149	+	- 11.6	+ 56.8	+ 42.1	best at the first, fifth, and sixth ob-
0. 20	M	,,	F	0.200	+0.148	+	- 11.6	+ 56.5	+ 57.3	servations.
0. 22	M	,,	F	0.200	+0.052	+	- 11.6	+ 27.4	+ 34.4	
0. 25	M	,,	F	0.200	+0.078	+ $\frac{3}{10}$	- 11.6	+ 35.3	+ 39.0	

MOTIONS OF STARS IN THE LINE OF SIGHT, INFERRED FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Oct. 22. ^d 0. ^h 30. ^m	M	Aldebaran.....	F	0'200	+0'080	+ $\frac{3}{8}$	- 11'9	+ 36'2	+ 48'5	Spectrum rather faint for this star. Definition poor.
0. 33	M	,,	F	0'200	+0'125	+ $\frac{3}{8}$	- 11'9	+ 49'8	+ 57'6	
0. 36	M	,,	F	0'200	+0'145	+ $\frac{3}{8}$	- 11'9	+ 55'9	+ 57'6	
0. 40	M	,,	F	0'200	+0'065	+ $\frac{1}{4}$	- 11'9	+ 31'6	+ 34'7	
										Position Circle, 6°.
Oct. 22. 12. 0	M	Sky	F	0'200	-0'006			- 1'8		The coincidence of the two spectra appeared perfect.
12. 5	M	,,	F	0'200	+0'034			+ 10'3		
12. 10	M	,,	F	0'200	-0'005			- 1'5		
12. 15	M	,,	F	0'200	-0'008			- 2'4		
12. 20	M	,,	F	0'200	+0'017			+ 5'1		
										Position Circle, 6°.
Oct. 24. 21. 38	M	α Pegasi.....	F	0'250	-0'067	- $\frac{1}{4}$	+ 11'1	- 31'4	- 32'8	Spectrum fairly bright and steady. Definition good.
21. 58	M	,,	F	0'250	-0'066	- $\frac{1}{4}$	+ 11'1	- 31'1	- 32'8	
22. 14	M	Moon	F	0'250	-0'027			- 8'2		The coincidence of the two spectra appeared perfect. Both spectra seen well.
22. 17	M	,,	F	0'250	+0'009			+ 2'7		
22. 20	M	,,	F	0'250	+0'005			+ 1'5		Spectrum bright, but rather tremulous. Star-line fairly well seen.
22. 23	M	,,	F	0'250	-0'008			- 2'4		
22. 27	M	,,	F	0'250	-0'001			- 0'3		Spectrum bright, but rather tremulous. Star-line fairly well seen.
22. 37	M	β Persei	F	0'250	-0'217	- $\frac{3}{10}$	- 6'8	- 59'1	- 19'2	
22. 47	M	,,	F	0'250	-0'159	- $\frac{1}{10}$	- 6'8	- 41'5	- 19'2	Spectrum bright, but rather tremulous. Star-line fairly well seen.
23. 5	M	,,	F	0'250	-0'083	- $\frac{1}{10}$	- 6'8	- 18'4	- 27'9	
23. 17	M	,,	F	0'250	-0'134	- $\frac{1}{10}$	- 6'8	- 33'9	- 36'6	Spectrum bright, but rather tremulous. Star-line fairly well seen.
23. 24	M	α Persei	F	0'250	-0'134	- $\frac{1}{10}$	- 7'9	- 32'8	- 35'5	
23. 30	M	,,	F	0'250	-0'197	- $\frac{1}{10}$	- 7'9	- 51'9	- 44'2	Spectrum bright but tremulous. Star-line seen well at intervals.
23. 40	M	Capella	F	0'250	-0'004	0	- 13'0	+ 11'8	+ 13'0	
23. 44	M	,,	F	0'250	+0'157	+ $\frac{3}{10}$	- 13'0	+ 60'7	+ 65'1	Spectrum bright and fairly steady. Star-line fairly well seen.
23. 48	M	,,	F	0'250	+0'093	+ $\frac{1}{10}$	- 13'0	+ 41'2	+ 42'0	
23. 52	M	,,	F	0'250	+0'089	+ $\frac{1}{10}$	- 13'0	+ 40'0	+ 47'7	Spectrum bright and fairly steady. Star-line fairly well seen.
23. 57	M	β Aurigæ	F	0'250	+0'078	+ $\frac{1}{10}$	- 14'5	+ 38'2	+ 43'5	
25. 0. 2	M	,,	F	0'250	+0'040	+ $\frac{1}{10}$	- 14'5	+ 26'6	+ 23'2	Spectrum bright and fairly steady, but star-line faint and seen with difficulty.
0. 8	M	α Aldebaran ...	F	0'250	+0'228	+ $\frac{3}{10}$	- 11'1	+ 80'3	+ 69'0	
0. 13	M	,,	F	0'250	+0'099	+ $\frac{1}{10}$	- 11'1	+ 41'2	+ 40'1	Spectrum bright and star-line well seen.
0. 19	M	Rigel	F	0'250	+0'149	+ $\frac{1}{10}$	- 11'1	+ 56'3	+ 54'5	
0. 21	M	,,	F	0'250	+0'079	+ $\frac{1}{10}$	- 11'1	+ 35'1	+ 19'8	Spectrum bright but tremulous. Star-line difficult to bisect.
0. 28	M	γ Orionis	F	0'250	-0'049	- $\frac{1}{10}$	- 13'3	- 1'6	- 4'1	
0. 31	M	,,	F	0'250	+0'062	+ $\frac{1}{10}$	- 13'3	+ 32'1	+ 35'0	Spectrum bright and fairly steady. Star-line seen fairly well.
0. 34	M	,,	F	0'250	-0'029	- $\frac{1}{10}$	- 13'3	+ 4'5	+ 4'6	
0. 36	M	,,	F	0'250	+0'058	+ $\frac{1}{10}$	- 13'3	+ 30'9	+ 35'0	Spectrum bright and fairly steady. Star-line seen fairly well.
0. 40	M	β Tauri	F	0'250	-0'112	- $\frac{1}{10}$	- 14'1	- 19'9	- 29'3	
0. 43	M	,,	F	0'250	-0'040	- $\frac{1}{10}$	- 14'1	+ 2'0	- 3'3	Spectrum fairly bright, but tremulous. Star-line seen much better than usual with this star.
0. 46	M	,,	F	0'250	-0'043	- $\frac{1}{10}$	- 14'1	+ 1'0	- 3'3	
0. 49	M	,,	F	0'250	+0'001	0	- 14'1	+ 14'4	+ 14'1	Spectrum bright but tremulous. Star-line seen better than usual.
0. 53	M	δ Orionis	F	0'250	-0'069	- $\frac{1}{10}$	- 13'0	- 8'0	- 8'7	
0. 56	M	,,	F	0'250	+0'002	0	- 13'0	+ 13'6	+ 13'0	Spectrum bright and tremulous. Star-line seen better than usual with this star, but held with difficulty.
0. 59	M	,,	F	0'250	-0'018	- $\frac{1}{10}$	- 13'0	+ 7'5	+ 8'7	
1. 2	M	,,	F	0'250	+0'024	+ $\frac{1}{10}$	- 13'0	+ 5'7	+ 30'4	Spectrum bright but tremulous. Star-line seen better than usual.
1. 8	M	ϵ Orionis	F	0'250	+0'090	+ $\frac{1}{10}$	- 13'1	+ 40'4	+ 34'8	
1. 12	M	,,	F	0'250	+0'051	+ $\frac{1}{10}$	- 13'1	+ 28'6	+ 34'8	Spectrum bright and tremulous. Star-line seen better than usual with this star, but held with difficulty.
1. 16	M	ζ Orionis	F	0'250	-0'065	- $\frac{1}{10}$	- 13'2	- 6'5	+ 4'5	
1. 19	M	,,	F	0'250	+0'048	+ $\frac{1}{10}$	- 13'2	+ 27'8	+ 21'9	Lines in Nebula very faint and bisections very rough.
1. 22	M	,,	F	0'250	-0'018	0	- 13'2	+ 7'7	+ 13'2	
1. 25	M	,,	F	0'250	+0'015	+ $\frac{1}{10}$	- 13'2	+ 17'7	+ 17'5	
1. 30	M	Gt. Nebula in Orion.	F	0'250	-0'141	- $\frac{1}{10}$	- 5'0	- 37'8	- 24'0	
1. 33	M	,,	F	0'250	+0'011	+ $\frac{1}{10}$	- 5'0	+ 8'3	+ 9'3	
1. 36	M	,,	F	0'250	+0'007	+ $\frac{1}{10}$	- 5'0	+ 7'1	+ 9'3	
1. 39	M	,,	F	0'250	-0'143	- $\frac{1}{10}$	- 5'0	- 38'4	- 24'0	
1. 42	M	,,	F	0'250	-0'097	- $\frac{1}{10}$	- 5'0	- 24'5	- 24'0	
1. 45	M	,,	F	0'250	+0'019	+ $\frac{1}{10}$	- 5'0	+ 10'8	+ 9'3	

AT THE ROYAL OBSERVATORY, GREENWICH, IN THE YEAR 1887.

Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Oct. 25. ^d 1. ^h 53. ^m	M	Sirius	F	r	0.250	-0.057	-13.6	-3.7	-8.1	Spectrum very bright, but very tremulous. Direct comparison failed to show any distinct displacement in either direction.
1. 57	M	,,	F	r	0.250	+0.108	-13.6	+46.4	+42.6	
2. 1	M	,,	F	r	0.250	+0.154	-13.6	+60.4	+57.0	
2. 5	M	,,	F	r	0.250	+0.048	-13.6	+28.2	+31.0	
2. 9	M	,,	F	r	0.250	+0.128	-13.6	+52.5	+48.3	
2. 13	M	,,	F	r	0.250	+0.066	-13.6	+33.6	+35.3	Position Circle, 6°.
Oct. 28. 21. 52	M	β Pegasi	b ₁	r	0.140	-0.131	+9.6	-58.8	-51.5	Spectrum somewhat faint and a little tremulous. Definition good.
21. 58	M	,,	b ₁	r	0.140	-0.121	+9.6	-55.0	-51.5	
22. 4	M	,,	b ₄	r	0.140	-0.065	+9.6	-34.0	-34.4	
22. 10	M	,,	b ₄	r	0.140	-0.129	+9.6	-58.0	-39.1	
22. 16	M	,,	b ₄	r	0.140	-0.121	+9.6	-55.0	-59.1	
22. 22	M	,,	b ₄	r	0.140	-0.184	+9.6	-78.6	-83.9	Spectrum rather faint and very tremulous. Star-line faint and difficult to see. The b ₁ line was narrow and sharp. The coincidence of the spectra appeared perfect.
22. 32	M	β Ceti.....	b ₁	r	0.140	-0.133	+9.8	-59.7	-60.1	
22. 37	M	,,	b ₁	r	0.140	-0.172	+9.8	-74.3	-72.7	
22. 42	M	Moon.....	b ₁	r	0.140	-0.006		-2.2		
22. 44	M	,,	b ₁	r	0.140	-0.003		-1.1		
22. 46	M	,,	b ₁	r	0.140	-0.002		-0.7		Spectrum fairly bright but tremulous. Measures considered good.
22. 48	M	,,	b ₁	r	0.140	-0.003		-1.1		
22. 50	M	,,	b ₁	r	0.140	-0.004		-1.5		
23. 2	M	β Andromedæ	b ₁	r	0.140	+0.111	+1.9	+39.7	+29.5	
23. 12	M	,,	b ₁	r	0.140	+0.068	+1.9	+23.6	+23.3	
23. 22	M	α Arietis	b ₁	r	0.140	+0.043	-0.3	+16.4	+12.9	Spectrum fairly bright but tremulous. Displacement evidently very small. Star-line somewhat broad, diffused, and not very dark.
23. 27	M	,,	b ₁	r	0.140	-0.058	-0.3	-21.5	-24.9	
23. 32	M	,,	b ₁	r	0.140	+0.052	-0.3	+19.8	+31.7	
23. 37	M	,,	b ₁	r	0.140	-0.017	-0.3	-6.1	+0.3	
23. 42	M	α Ceti.....	b ₁	r	0.140	+0.020	-2.4	+9.9	+15.0	
23. 46	M	,,	b ₁	r	0.140	-0.034	-2.4	-10.3	-10.2	It seems clear that the edge of the dark fluted band in this star is not the b ₁ line. Assuming the observations of the b ₁ line to be correct, the wave length of the edge of the band, corrected for motion of earth and star, will be λ = 5162.63, Angström's value, 5166.88, for b ₄ being assumed.
23. 50	M	,,	b ₁	r	0.140	-0.002	-2.4	+1.7	+2.4	
23. 54	M	,,	b ₁	r	0.140	+0.001	-2.4	+2.1	+2.4	
23. 58	M	α Ceti.....	b ₄	r	0.140	-0.389	-2.4	-143.6	-183.4	
Oct. 29. 0. 1	M	,,	b ₄	r	0.140	-0.354	-2.4	-130.5	-152.5	
0. 10	M	Aldebaran.....	b ₁	r	0.140	+0.085	-10.1	+42.0	+52.0	Spectrum bright but tremulous. Star-line seen with difficulty.
0. 15	M	,,	b ₁	r	0.140	+0.097	-10.1	+46.5	+47.8	
0. 17	M	,,	b ₁	r	0.140	+0.037	-10.1	+24.0	+22.7	
0. 20	M	,,	b ₁	r	0.140	+0.123	-10.1	+56.3	+60.4	
0. 30	M	Capella	b ₁	r	0.140	+0.112	-12.1	+54.1	+62.4	Spectrum very tremulous. Star-line seen with difficulty, although the spectrum was very bright.
0. 35	M	,,	b ₁	r	0.140	+0.059	-12.1	+34.3	+49.8	
0. 40	M	,,	b ₁	r	0.140	+0.175	-12.1	+77.8	+75.0	
0. 45	M	,,	b ₁	r	0.140	+0.087	-12.1	+44.7	+54.0	
0. 55	M	α Orionis	b ₁	r	0.140	+0.152	-14.1	+71.2	+77.0	
1. 5	M	,,	b ₁	r	0.140	+0.142	-14.1	+67.4	+77.0	Spectrum bright, but very tremulous. Star-lines difficult to hold steadily.
1. 15	M	,,	b ₄	r	0.140	+0.174	-14.1	+79.4	+76.0	
1. 25	M	,,	b ₄	r	0.140	+0.162	-14.1	+74.9	+76.0	
1. 35	M	Pollux	b ₁	r	0.140	-0.206	-18.0	-59.3	-57.5	
1. 42	M	,,	b ₁	r	0.140	-0.107	-18.0	-22.2	-23.9	
1. 48	M	,,	b ₁	r	0.140	-0.197	-18.0	-55.9	-57.5	Spectrum bright, but very tremulous. Star-line very faint and difficult to observe.
1. 55	M	,,	b ₁	r	0.140	-0.252	-18.0	-76.6	-65.8	
2. 17	M	Procyon.....	b ₁	r	0.140	+0.075	-17.6	+45.8	+49.0	
2. 24	M	,,	b ₁	r	0.140	+0.189	-17.6	+88.5	+93.1	
2. 32	M	,,	b ₁	r	0.140	+0.077	-17.6	+46.5	+49.0	
2. 42	M	,,	b ₁	r	0.140	+0.047	-17.6	+35.2	+42.8	Position Circle, 6°.
Oct. 31. 20. 40	M	α Cygni	b ₁	r	0.120	-0.220	+8.4	-91.0	-76.5	Spectrum bright but tremulous. Defini- tion bad. Star-line faint and seen with great difficulty.
20. 50	M	,,	b ₁	r	0.120	-0.232	+8.4	-95.5	-85.0	
21. 5	M	γ Cygni	b ₁	r	0.120	-0.008	+9.8	-12.8	-9.8	Spectrum faint and tremulous. Definition bad. Star-line seen with difficulty.
21. 15	M	,,	b ₁	r	0.120	-0.089	+9.8	-43.2	-43.8	
21. 25	M	,,	b ₁	r	0.120	-0.008	+9.8	-12.8	-9.8	
21. 35	M	,,	b ₁	r	0.120	-0.007	+9.8	-12.4	-9.8	

Date, 1887. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Displacement.		Earth's Motion in Miles per Second.	Concluded Motion of Stars in Miles per Second.		REMARKS.
					Measured.	Estimated.		Measured.	Estimated.	
Oct. ^{d h m} 31. 21. 45	M	ε Cygni	b ₁	0.120	-0.042	- $\frac{1}{10}$	+ 11.5	- 27.2	- 21.7	Spectrum faint and tremulous. Definition bad. Star-line faint and difficult to see. Measures rough and made with extreme difficulty.
21. 52	M	,,	b ₁	0.120	+0.010	0	+ 11.5	- 7.7	- 11.5	
22. 0	M	,,	b ₁	0.120	+0.030	+ $\frac{1}{10}$	+ 11.5	- 0.2	- 1.3	Spectrum faint and tremulous. Definition bad. Star-line faint and difficult to see.
22. 10	M	,,	b ₁	0.120	-0.002	0	+ 11.5	- 12.2	- 11.5	
22. 30	M	ε Pegasi	b ₁	0.120	+0.140	+ $\frac{1}{2}$	+ 16.0	+ 36.6	+ 35.0	Spectrum rather faint and tremulous. Star-line seen with difficulty.
22. 50	M	,,	b ₁	0.120	-0.028	- $\frac{1}{10}$	+ 16.0	- 26.5	- 26.2	
23. 20	M	β Pegasi	b ₁	0.120	-0.046	- $\frac{1}{5}$	+ 10.3	- 27.6	- 30.7	Spectrum fairly bright and steady. Star-line seen fairly well.
23. 30	M	,,	b ₁	0.120	-0.009	0	+ 10.3	- 13.7	- 10.3	
23. 43	M	α Cassiopeiæ ...	b ₁	0.120	+0.164	+ $\frac{3}{5}$	+ 0.5	+ 61.1	+ 60.8	Spectrum fairly bright and steady. Star-line dark and fairly well seen. Observation considered good.
23. 52	M	,,	b ₁	0.120	+0.152	+ $\frac{1}{2}$	+ 0.5	+ 56.5	+ 50.5	
Nov. 1. 0. 4	M	β Andromedæ	b ₁	0.120	+0.045	+ $\frac{1}{5}$	+ 2.8	+ 14.1	+ 17.6	Spectrum fairly bright and steady. Star-line faint and seen with difficulty.
0. 12	M	,,	b ₁	0.120	+0.112	+ $\frac{2}{5}$	+ 2.8	+ 39.2	+ 38.1	
0. 24	M	γ Andromedæ	b ₁	0.120	-0.035	- $\frac{1}{10}$	- 1.2	- 11.9	- 9.0	The two spectra were exactly coincident, both being exceedingly bright, distinct, and well-defined.
0. 30	M	,,	b ₁	0.120	-0.077	- $\frac{3}{10}$	- 1.2	- 27.7	- 29.4	
0. 43	M	Moon	b ₁	0.120	+0.004			+ 1.5		Position Circle, 6°.
0. 46	M	,,	b ₁	0.120	-0.009			- 3.4		
0. 49	M	,,	b ₁	0.120	-0.003			- 1.1		
0. 52	M	,,	b ₁	0.120	-0.002			- 0.7		
0. 55	M	,,	b ₁	0.120	-0.004			- 1.5		

COLLECTED RESULTS for MOTIONS of STARS in the line of Sight, from SPECTROSCOPIC OBSERVATIONS
made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1887.

(F for the Star or Moon is compared with $H\beta$ of Hydrogen, and b_1, b_2, b_4 with Mg, Mg_1, Mg_3 of Magnesium.)

(+ denotes Recession ; - Approach.)

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.	
								Measured.	Estimated.
α ANDROMEDÆ.									
F line broad and nebulous. Estimated total breadth, 18 tenth-metres ; central and more condensed portion, 8 tenth-metres.									
September 1	M	2	1	6	0.163	F	- 9.2	- 23.0	- 26.0
October 14	M	2	1	6	0.200	F	+ 2.5	- 5.9	- 7.1
19	M	2	1	6	0.200	F	+ 3.9	- 26.1	- 26.8
21	M	4	1	6	0.200	F	+ 4.5	- 24.2	- 25.1
β CASSIOPELÆ.									
F line broad, faint, and diffused at the edges.									
October 19	M	2	1	6	0.200	F	- 1.5	+ 7.9	+ 7.6
γ PEGASI.									
F line broad and diffused at the edges.									
September 1	M	4	1	6	0.163	F	- 8.7	- 22.7	- 23.2
October 14	M	2	1	6	0.200	F	+ 4.3	- 25.9	- 27.2
19	M	2	1	6	0.200	F	+ 5.7	- 20.6	- 21.0
α CASSIOPELÆ.									
F line narrow but faint ; <i>b</i> lines fairly distinct.									
October 19	M	2	1	6	0.200	F	- 2.2	+ 13.9	+ 11.3
31	M	2	1	6	0.120	<i>b</i> ₁	+ 0.5	+ 58.8	+ 55.7

12 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.	
								Measured.	Estimated.
β CETI.									
<i>b</i> lines faint, but narrow and sharp.									
October 28	M	2	1	6	0.140	<i>b</i> ₁	+ 9.8	− 67.0	− 66.4
γ CASSIOPEIÆ.									
F line brighter, but not much brighter than the continuous spectrum. Narrow on Feb. 16; broader and more diffused than usual on Oct. 19.									
February 16	M	6	1	6	0.138	F	+ 12.0	+ 1.7	− 1.9
October 19	M	2	1	6	0.200	F	− 3.4	− 17.1	− 21.0
β ANDROMEDÆ.									
<i>b</i> lines narrow, sharp, and fairly dark.									
October 28	M	2	1	6	0.140	<i>b</i> ₁	+ 1.9	+ 31.7	+ 26.4
November 1	M	2	1	6	0.120	<i>b</i> ₁	+ 2.8	+ 26.7	+ 27.9
β ARIETIS.									
F line dark, broad, and diffused.									
October 21	M	2	1	6	0.200	F	− 1.4	+ 48.8	+ 51.7
γ ANDROMEDÆ.									
The two components of this double star have been observed together as one star. <i>b</i> lines narrow and sharp, but faint.									
February 16	M	2	1	6	0.138	F	+ 16.1	− 13.4	− 12.8
November 1	M	2	1	6	0.120	<i>b</i> ₁	− 1.2	− 19.8	− 19.2
α ARIETIS.									
F line narrow and sharp, but very faint. <i>b</i> lines somewhat broad and diffused, and not very dark.									
October 15	M	2	1	6	0.200	F	− 4.7	− 0.5	− 4.4
21	M	4	1	6	0.200	F	− 2.6	+ 20.0	+ 25.5
28	M	4	1	6	0.140	<i>b</i> ₁	− 0.3	+ 2.2	+ 5.0

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
α CETI. Third type spectrum. The b lines stand out on the background of a shaded band, which is however but faint in this star.										
October 29	M	4	1	6	0.140	b_1	- 2.4	+ 0.9	+ 2.4	
29	M	2	1	6	0.140	*	- 2.4	-137.1	-168.0	
* Measure of the dark line forming the sharp edge of the fluted band, and coincident in most spectra of the type with b_4. It appears clear that it is not so in this star, and, assuming the observations of the b_1 line to be correct, the wave length of the edges of the band, corrected for motion of earth and star, will be $\lambda = 5162.63$, Angström's value, 5166.88, for b_4 being assumed.										
β PERSEI. F line broad; estimated breadth, 18 to 20 tenth-metres. The character of the line is not always the same. Usually it is nebulous without any central condensation, but on rare occasions has been observed as dark and sharply defined. Estimated breadth on Jan. 28, 13 tenth-metres.										
January 26	M	4	1	6	0.200	F	+ 16.6	- 90.0	- 93.7	
28	M	4	1	6	0.230	F	+ 16.8	- 16.5	- 13.0	
31	M	5	1	6	0.160	F	+ 17.0	- 18.4	- 17.0	
February 2	M	4	1	6	0.152	F	+ 17.1	-108.6	-105.2	
15	M	6	1	6	0.138	F	+ 17.4	- 51.0	- 49.0	
16	M	6	1	6	0.138	F	+ 17.4	- 44.0	- 40.9	
October 20	M	4	1	6	0.200	F	- 8.1	- 51.4	- 52.8	
21	M	4	1	6	0.200	F	- 7.6	- 81.3	- 63.2	
24	M	4	1	6	0.250	F	- 6.8	- 38.7	- 25.7	
α PERSEI. The F line in this spectrum resembles that of Procyon, viz., a narrow but rather faint line on a broad nebulous band. The breadth of this band is difficult to estimate, but would appear to be about 18 tenth-metres.										
February 16	M	4	1	6	0.138	F	+ 16.3	- 12.4	- 11.3	
October 20	M	2	1	6	0.200	F	- 9.0	- 26.9	- 27.6	
21	M	2	1	6	0.200	F	- 8.6	- 55.6	- 53.1	
24	M	2	1	6	0.250	F	- 7.9	- 42.4	- 39.9	
α TAURI (<i>Aldebaran</i>). F line narrow, sharp, and fairly dark; b lines narrow, sharp, and distinct.										
January 28	M	2	1	6	0.230	F	+ 16.4	+ 20.8	+ 29.3	
February 16	M	2	1	6	0.138	F	+ 18.4	+ 24.9	+ 29.1	
October 15	M	2	1	6	0.200	F	- 13.5	+ 47.5	+ 47.1	
20	M	3	1	6	0.200	F	- 12.4	+ 47.7	+ 49.3	
22	M	4	1	6	0.200	F	- 11.9	+ 43.4	+ 49.6	
25	M	2	1	6	0.250	F	- 11.1	+ 60.8	+ 54.6	
29	M	4	1	6	0.140	b_1	- 10.1	+ 42.2	+ 45.7	

14 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
α AURIGÆ (<i>Capella</i>).										
F line narrow and sharp, but not very dark ; <i>b</i> lines narrow, sharp, and fairly dark.										
January 26	M	4	1	6	0.200	F	+ 12.6	+ 3.8	+ 8.1	
February 16	M	2	1	6	0.138	F	+ 15.9	+ 18.5	+ 20.3	
October	22	M	4	1	6	0.200	F	— 13.5	+ 52.3	+ 52.7
	25	M	4	1	6	0.250	F	— 13.0	+ 38.4	+ 41.9
	29	M	4	1	6	0.140	<i>b</i> ₁	— 12.1	+ 52.7	+ 60.3
β ORIONIS (<i>Rigel</i>).										
F line narrow, sharp, and fairly dark ; estimated breadth, 0.9 tenth-metre.										
January	27	M	2	1	6	0.200	F	+ 12.7	+ 14.5	+ 18.9
	31	M	2	1	6	0.160	F	+ 13.5	+ 23.9	+ 10.8
February	3	M	2	1	6	0.152	F	+ 13.8	+ 13.5	+ 12.7
	12	M	2	1	6	0.138	F	+ 15.0	+ 1.0	+ 1.7
	16	M	2	1	6	0.138	F	+ 15.4	— 5.0	— 0.9
October	20	M	2	1	6	0.200	F	— 12.0	+ 32.4	+ 36.4
	22	M	6	1	6	0.200	F	— 11.6	+ 28.7	+ 28.8
	25	M	2	1	6	0.250	F	— 11.1	+ 45.7	+ 37.2
γ ORIONIS.										
F line fairly dark, but not very narrow, and slightly diffused at the edges. Estimated breadth, 6 tenth-metres. No strongly marked central condensation.										
January 31	M	2	1	6	0.160	F	+ 14.4	— 23.7	— 21.7	
February	12	M	2	1	6	0.138	F	+ 16.3	+ 26.2	+ 26.0
	16	M	4	1	6	0.138	F	+ 16.8	— 12.6	— 12.9
October	22	M	2	1	6	0.200	F	— 13.8	+ 8.7	+ 9.3
	25	M	4	1	6	0.250	F	— 13.3	+ 16.5	+ 17.6
β TAURI.										
F line broad, diffused, and fairly dark. Breadth about 13 tenth-metres ; central condensation, 3 tenth-metres.										
January 31	M	2	1	6	0.160	F	+ 14.6	— 24.5	— 21.9	
February 16	M	2	1	6	0.138	F	+ 17.2	— 10.0	— 10.5	
October	22	M	4	1	6	0.200	F	— 14.7	— 19.6	— 12.3
	25	M	4	1	6	0.250	F	— 14.1	— 0.6	— 5.5

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
δ ORIONIS. F line faint and ill-defined ; breadth about 4 tenth-metres.										
February 16	M	4	1	6	0.138	F	+ 15.8	+ 11.4	+ 12.8	
October 25	M	4	1	6	0.250	F	− 13.0	+ 4.7	+ 10.9	
ε ORIONIS. F line narrow and fairly dark ; breadth about 1 tenth-metre.										
February 16	M	2	1	6	0.138	F	+ 15.6	+ 16.8	+ 18.0	
October 25	M	2	1	6	0.250	F	− 13.1	+ 34.5	+ 34.8	
ζ ORIONIS. F line narrow and fairly dark ; breadth about 1 tenth-metre.										
February 16	M	4	1	6	0.138	F	+ 15.4	− 23.6	− 20.1	
October 25	M	4	1	6	0.250	F	− 13.2	+ 11.7	+ 14.3	
κ ORIONIS. F line faint as seen on Feb. 16.										
February 16	M	2	1	6	0.138	F	+ 14.1	− 28.4	− 25.3	
α ORIONIS. Third type spectrum. The <i>b</i> lines stand out on the background of a shaded band from which it is often difficult to separate them.										
October 29	M	2	1	6	0.140	<i>b</i> ₁	− 14.1	+ 69.3	+ 77.0	
29	M	2	1	6	0.140	<i>b</i> ₄	− 14.1	+ 77.2	+ 76.0	

16 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
β AURIGÆ.										
F line dark, broad, and nebulous.										
October	22	M	2	1	6	0.200	F	- 15.0	+ 41.3	+ 41.7
	25	M	2	1	6	0.250	F	- 14.5	+ 32.4	+ 33.4
γ GEMINORUM.										
F line dark, but very broad and very diffused at the edges. Estimated breadth, 21 tenth-metres; central condensation, 8 tenth-metres.										
February	16	M	2	1	6	0.138	F	+ 14.4	- 74.7	- 64.8
α CANIS MAJORIS (<i>Sirius</i>).										
F line dark, but very broad and diffused at the edges. Estimated breadth, 20 tenth-metres; central condensation, 5 tenth-metres. On Feb. 12, the total breadth of the line, including a faint shading on either side, was estimated at 29 tenth-metres. The line appeared more steeply shaded towards the red than towards the blue.										
January	27	M	2	1	6	0.230	F	+ 6.0	- 25.8	- 27.0
February	3	M	6	1	6	0.152	F	+ 7.6	+ 12.7	+ 12.4
	12	M	4	1	6	0.138	F	+ 9.6	- 13.0	- 11.3
	16	M	6	1	6	0.138	F	+ 10.3	- 6.8	- 7.5
October	25	M	6	1	6	0.250	F	- 13.6	+ 36.2	+ 34.4
α GEMINORUM (<i>Castor</i>).										
The two components of this double star have been observed together as one star.										
F line very broad and nebulous. Estimated breadth about 14 tenth-metres, with a faint shading on either side to a total breadth of about 34 tenth-metres; no central condensation.										
February	3	M	2	1	6	0.152	F	+ 8.0	- 35.9	- 36.2
	16	M	4	1	6	0.138	F	+ 11.5	- 17.7	- 15.1
α CANIS MINORIS (<i>Procyon</i>).										
F line narrow, but rather faint and on a back ground of a diffused shading. Estimated breadth of line, 1 tenth-metre; of shading, 13 tenth-metres; <i>b</i> line narrow and very faint.										
February	3	M	2	1	6	0.152	F	+ 6.2	+ 20.2	+ 20.2
	16	M	4	1	6	0.138	F	+ 10.0	- 10.7	- 7.5
October	29	M	4	1	6	0.140	<i>b</i> ₁	- 17.6	+ 54.0	+ 58.5

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
β GEMINORUM (<i>Pollux</i>).										
F line narrow but faint. <i>b</i> lines narrow and sharp but faint.										
February 16	M	2	1	6	0.138	F	+ 10.8	- 44.4	- 38.7	
October 29	M	4	1	6	0.140	<i>b</i> ₁	- 18.0	- 53.5	- 51.2	
α BOÖTIS (<i>Arcturus</i>).										
F line narrow and sharp. <i>b</i> lines dark, narrow, and sharp.										
July 4	M	2	1	6	0.167	F	+ 15.0	- 43.3	- 45.1	
11	M	2	1	6	0.160	F	+ 15.2	- 43.3	- 44.5	
α CORONÆ BOREALIS.										
F line dark and very broad, but not very diffused at the edges. Estimated breadth, 18 tenth-metres. No marked central condensation.										
July 11	M	2	1	6	0.160	F	+ 11.8	+ 20.7	+ 20.7	
August 24	M	2	1	6	0.090	F	+ 12.1	- 32.9	- 30.8	
α OPHIUCHI.										
F line dark, very broad, and diffused at the edges. Estimated breadth, 34 tenth-metres; central portion, 10 tenth-metres.										
July 12	M	2	1	6	0.160	F	+ 6.9	- 21.5	- 21.0	
August 24	M	2	1	6	0.090	F	+ 13.7	- 43.6	- 34.4	
α LYRÆ (<i>Vega</i>).										
F line dark, broad, and diffused at the edges. Estimated breadth, 16 tenth-metres; central condensation, 4 tenth-metres.										
July 12	M	2	1	6	0.160	F	+ 0.8	- 38.1	- 41.5	
August 22	M	2	1	6	0.135	F	+ 6.1	- 54.0	- 55.5	
24	M	2	1	6	0.090	F	+ 6.3	- 63.1	- 47.8	
31	M	4	1	6	0.163	F	+ 6.9	- 51.3	- 58.3	
September 2	M	2	1	6	0.163	F	+ 7.1	- 47.2	- 49.3	
October 10	M	2	1	6	0.460	F	+ 8.7	- 55.6	- 57.5	
14	M	2	1	6	0.200	F	+ 8.7	- 43.4	- 41.4	

18 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
γ LYRÆ. F line broad, diffused, and faint.										
August	22	M	2	1	6	0.135	F	+ 6.5	- 57.3	- 51.8
ζ AQUILÆ. F line broad, nebulous, and faint.										
August	23	M	2	1	6	0.135	F	+ 9.6	- 27.1	- 27.4
δ CYGNI. F line broad, diffused, and faint.										
October	10	M	4	1	6	0.460	F	+ 7.1	- 25.1	- 25.9
α AQUILÆ (<i>Altair</i>). F line dark, very broad, and diffused at the edges. Estimations of breadth very discordant, ranging from 13 to 31 tenth-metres.										
July	12	M	2	1	6	0.160	F	- 2.9	- 39.8	- 40.4
August	23	M	2	1	6	0.135	F	+ 7.7	- 53.3	- 57.1
	25	M	2	1	6	0.090	F	+ 8.1	- 50.3	- 39.2
	31	M	4	1	6	0.163	F	+ 9.7	- 71.0	- 63.5
October	10	M	2	1	6	0.460	F	+ 15.7	- 13.6	- 15.7
	14	M	2	1	6	0.200	F	+ 15.9	- 16.9	- 22.8
γ CYGNI. F line narrow, but faint; <i>b</i> lines narrow, but not very dark.										
October	14	M	2	1	6	0.200	F	+ 8.5	- 29.6	- 35.2
	31	M	4	1	6	0.120	<i>b</i> ₁	+ 9.8	- 20.3	- 18.3

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		
								Measured.	Estimated.	
α CYGNI.										
F line narrow and fairly dark ; <i>b</i> lines narrow but faint.										
August	23	M	2	1	6	0.135	F	- 0.7	- 43.1	- 44.6
	31	M	2	1	6	0.163	F	+ 0.7	- 47.5	- 47.1
October	14	M	2	1	6	0.200	F	+ 6.8	- 39.0	- 33.5
	31	M	2	1	6	0.120	<i>b</i> ₁	+ 8.4	- 93.3	- 80.8
ϵ CYGNI.										
F line narrow and very faint ; <i>b</i> lines narrow and faint.										
October	14	M	2	1	6	0.200	F	+ 9.9	- 1.4	+ 1.5
	31	M	4	1	6	0.120	<i>b</i> ₁	+ 11.5	- 11.8	- 11.5
α CEPHEI.										
F line broad, diffused, and dark.										
August	23	M	2	1	6	0.135	F	- 4.3	- 47.5	- 47.1
October	14	M	2	1	6	0.200	F	+ 1.2	- 60.6	- 58.3
ϵ PEGASI.										
F line narrow and sharp, but rather faint ; <i>b</i> lines narrow and faint.										
October	14	M	2	1	6	0.200	F	+ 13.3	+ 26.5	+ 32.4
	31	M	2	1	6	0.120	<i>b</i> ₁	+ 16.0	+ 5.1	+ 4.4
β PEGASI.										
Third type spectrum. The <i>b</i> lines stand out on the back ground of a shaded band, from which it is often difficult to separate them.										
October	28	M	2	1	6	0.140	<i>b</i> ₁	+ 9.6	- 56.9	- 51.5
	28	M	4	1	6	0.140	<i>b</i> ₁	+ 9.6	- 56.6	- 54.1
	31	M	2	1	6	0.120	<i>b</i> ₁	+ 10.3	- 20.7	- 20.5

20 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date, 1887.	Observer.	Number of Measures.	Number of Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.	
								Measured.	Estimated.
α PEGASUS.									
F line broad and diffused at the edges.									
September 1	M	4	1	6	0.163	F	- 4.0	- 25.9	- 29.8
October 14	M	2	1	6	0.200	F	+ 8.5	- 5.6	- 4.0
19	M	2	1	6	0.200	F	+ 9.8	- 22.7	- 23.5
24	M	2	1	6	0.250	F	+ 11.1	- 31.3	- 32.8
GREAT NEBULA IN ORION.									
October 25	M	6	1	6	0.250	F	- 5.0	- 12.4	- 7.4
MOON.									
January 31	M	5	1	6	0.160	F	...	+ 1.5	...
February 3	M	5	1	6	0.152	F	...	+ 1.6	...
July 12	M	5	1	6	0.160	F	...	0.0	...
August 31	M	5	1	6	0.163	F	...	+ 0.8	...
October 24	M	5	1	6	0.250	F	...	- 1.3	...
28	M	5	1	6	0.140	b ₁	...	- 1.3	...
November 1	M	5	1	6	0.120	b ₁	...	- 1.0	...
SKY.									
February 17	M	...	1	6	0.138	F	...	0.0	...
October 11	M	5	1	6	0.460	F	...	+ 5.3	...
22	M	5	1	6	0.200	F	...	+ 1.9	...

OBSERVATIONS of the SPECTRA of γ CASSIOPELÆ, α ORIONIS, and β LYRÆ made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1887.

γ CASSIOPELÆ.

1887, February 16.

Observer, M.

With the single-prism spectroscope the bright F line was very distinct, both when a cylindrical lens was used before the slit and when it was not. But the C line was not seen at all.

With the half-prism spectroscope, one prism train direct, the bright F line was a very difficult object, and could not be held steadily. It was a narrow line, but so faint that it was generally lost as the pointer was moved up to it, so that it was exceedingly difficult to get measures of its position, and those obtained were only rough. The C line was not looked for with this dispersion. The entire spectrum was only poorly defined.

1887, October 19.

Observer, M.

The spectrum was steady, but rather faint. The F line was distinctly a bright line, but was not much brighter than the continuous spectrum. The F line appeared broader and more diffused than usual. The C line was not looked for. The half-prism spectroscope, with one prism train, direct, was used.

1887 December 5.

Observer, M.

The single-prism spectroscope was used upon this star. The D_3 line was looked for, but could not be seen. F was occasionally just glimpsed as a bright line; very little brighter than the continuous spectrum, barely distinguishable from it at the best, and often not distinguishable at all.

But C was *brilliant*, so bright that it could not be possibly overlooked; though the observer had never seen the C line bright in this star before, nor ever failed to see F bright.

No measures were obtained, the sky clouding over before they could be arranged for.

1887, December 16.

Observer, M.

The half-prism spectroscope, one prism train reversed, was used, both with a cylindrical lens before the slit, and with no cylindrical lens at all. With no cylindrical lens, C was unmistakably seen as a bright line, but it was not at all strikingly bright; it had to be looked for, and did not force itself on the attention. The F line was not detected without a cylindrical lens, but with it was seen as a bright line, quite unmistakable when carefully searched for, but faint and narrow. D_3 was not seen at all. C could not be seen when the cylindrical lens was used, as the entire red end of the spectrum was lost; the spectrum being about 14" in width. Perhaps this was partly owing to cloud, for light cloud was constantly passing, and twice entirely stopped the work of observation for a considerable time. Later on the single-prism spectroscope was used, and, as with the half-prism spectroscope, C was seen as a bright line when no cylindrical lens was used, but could not be seen at all when the cylindrical lens was placed before the slit. The half-prism spectroscope was also used again with precisely the same results as before.

α ORIONIS.

1887, December 16.

Observer, M.

The spectrum of this star was examined with the single-prism spectroscope, and was seen remarkably well; the definition of the great bands and fine lines and fainter bands being very fine. The spectrum of the star was compared with the spectra of Sodium, Manganese, and Carbon, all three as given by a Bunsen flame. The carbon band at λ 5164 was coincident (within the limits of observation with this dispersion) with the bright space towards the blue of Band VI., and the Sodium lines were clearly represented by two dark lines near the middle of Band II., but the two bands of Manganese observed, not only did not coincide with any great band of the spectrum, but were very far distant from any of them. There were, indeed, faint fine lines about the neighbourhood of either manganese band, but the entire spectrum from end to end is full of such lines, and no fluting nor anything corresponding to one could be detected near the place of these two bands. A third manganese band was very close to Band II. of the stellar spectrum.

The following measures were obtained of the dark sharp edges of several of the principal fluted bands in the star spectrum. The sodium lines, and the bright sharp edges of two of the manganese bands, and a few fine but dark lines of the stellar spectrum were also measured at the same time:—

α Orionis.	Bunsen Flame.	Wave length, tenth-metres.
Band I.		6173
	Sodium lines	5892
Band II.		5859
Line		5822
Line		5779
	Manganese band	5577
Line		5497
Band V.		5445
Line		5418
	Manganese band	5348
Band VI.		5164
Band VII.		4954
Band VIII.		4780
Band IX.		4603

The sharp edge of another dark band in the extreme red of the stellar spectrum was estimated to be at λ 6540 $\pm$.

Ångström's value for the wave length of the D lines, 5892 tenth-metres was assumed.

The bands are numbered as in the observations of β Pegasi on 1876, October 18.

 β LYRÆ.

1887, December 16.

Observer, M.

The half-prism spectroscope, one prism train reversed, was employed upon this star. With a cylindrical lens before the slit, no lines, bright or dark, were detected in any part of the spectrum. When the cylindrical lens was removed there was a suspicion of a bright line at or near C, but there was no trace of any line near D₃ or F. The star was lost in cloud before the position of the suspected bright line near C could be determined. The slit was used with various widths; the narrowest clearly separating between the two D lines of the sodium flame; the widest sufficiently wide, or perhaps more than sufficiently wide, to admit all the light of the star.