

ROYAL OBSERVATORY, GREENWICH.

SPECTROSCOPIC OBSERVATIONS

MADE AT THE

ROYAL OBSERVATORY, GREENWICH,

1886.

POSITION-ANGLES and HEIGHTS of SOLAR PROMINENCES, observed with the SPECTROSCOPE, and OBSERVATIONS of BRIGHT LINES in their SPECTRA, made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1886.

Civil Time commencing at Greenwich Mean Midnight and counting from 0 to 24 hours is used throughout.

Note.—The position-angles reckoned from the north pole of the Sun's axis in the direction N., E., S., W., N., are given for the two extremities of the prominence.

The extreme height in seconds of arc is given for each prominence. Where the estimated brightness of any of the bright lines is given, the *average* brightness of the line has been estimated in terms of the brightness of the corresponding part of the solar spectrum. The lines are usually fainter at the extremity than at the base. Where the estimated breadth is given, the *average* breadth of the line has been estimated in terms of the breadth of the corresponding dark line in the solar spectrum, except in the case of the bright line D₃, the breadth of which is estimated in terms of the dark line C. The bright lines are usually narrower at the extremity than at the base. On each occasion the entire limb of the Sun was examined first on the C line only, and the heights and position-angles of the prominences were determined. If possible a second examination of the entire limb was then made in which the entire spectrum from B to F was examined at each prominence. The first time given for any prominence is the time when it was first seen; the second time, the time of the second examination.

The "Half-prism" Spectroscope with a train of two "half-prisms" was used throughout. For viewing the prominences and chromosphere the spectroscope is reversed end for end, the slit and eyepiece being interchanged, so that the pencil is incident on the oblique face and emerges at the perpendicular face of each "half-prism." Thus the breadth of the spectrum-lines, considered as monochromatic images of the slit, is diminished, and greater purity of spectrum is obtained. In order to view a prominence in its just proportions, the breadth can be afterwards magnified by means of a small "half-prism" (direct-vision) placed between the eyepiece and the eye.

A displacement of 1 tenth-metre corresponds to a motion in the line of sight of 28.4 miles per second for the C line, of 36.1 miles for the D lines, and of 38.4 miles for the F line.

Observer M.

Greenwich Civil Time, 1886.	Position-Angle from Sun's Axis.	Height in Seconds of Arc.				Brightness.				Breadth.				REMARKS.
		C	D ₃	1474 K	F	C	D ₃	1474 K	F	C	D ₃	1474 K	F	
d h m	° '	"	"	"	"									
Apr. 27. 11. 26	40. 25	43	43	...	...	$\frac{2}{5}$	$\frac{1}{5}$	...	...	$\frac{2}{3}$	$\frac{1}{3}$	...	...	Straight jet.
11. 58	44. 32	43		...	...	$\frac{2}{5}$	$\frac{1}{5}$	...	...	$\frac{2}{3}$	$\frac{1}{3}$	...	...	
11. 24	46. 7	41	38	...	...	$\frac{1}{2}$	$\frac{1}{4}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	Fine bright jet bending over towards the north.
11. 56	49. 37	41		...	...	$\frac{1}{2}$	$\frac{1}{4}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	
11. 22	55. 12	48	41	...	...	$\frac{1}{4}$	$\frac{1}{5}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	Double jet.
11. 42	62. 17	53		...	...	$\frac{1}{4}$	$\frac{1}{5}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	
11. 20	71. 7	34	19	...	...	$\frac{1}{2}$	$\frac{1}{5}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	
11. 39	74. 7	31		...	...	$\frac{1}{2}$	$\frac{1}{5}$	...	...	$\frac{3}{4}$	$\frac{1}{3}$	...	...	
11. 10	86. 57	24	19	...	...	$\frac{2}{3}$	$\frac{1}{5}$	...	...	$\frac{2}{3}$	$\frac{1}{3}$	...	...	The entire limb of the sun was examined twice with the slit radial. The limb was too unsteady for any observations of 1474 K and F to be made.
11. 37	89. 37	24		...	...	$\frac{2}{3}$	$\frac{1}{5}$	...	...	$\frac{2}{3}$	$\frac{1}{3}$	...	...	
Apr. 30. 12. 20	108. 52	14	19	...	14	$\frac{1}{2}$	$\frac{1}{2}$	...	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{1}{2}$	...	$\frac{3}{4}$	Straight jet. 12 ^h 28 ^m . This prominence has changed in shape since it was first seen. It is still a straight jet, but has spread out at the top like a palm-tree.
12. 30	109. 32	17		...	14	$\frac{1}{2}$	$\frac{1}{2}$	...	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{1}{2}$	...	$\frac{3}{4}$	
12. 15	114. 32	31	34	4	24	1	$\frac{1}{2}$	...	$\frac{1}{5}$	$\frac{2}{3}$	$\frac{1}{3}$	...	$\frac{3}{4}$	Straight jet.
12. 28	118. 22	31		...	24	$\frac{1}{2}$	$\frac{1}{4}$	...	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	...	$\frac{3}{4}$	
12. 16	120. 7	29	29	...	24	$\frac{1}{2}$	$\frac{1}{4}$	...	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	...	$\frac{3}{4}$	The limb of the sun was unsteady, making observation difficult. On all the three foregoing prominences neither the D nor D lines could be seen distinctly reversed, probably on account of the white haze in which the sun was involved, and the unsteadiness of the limb; yet these dark lines of the sky spectrum grew faint close to the sun's limb. 1474 K was seen distinctly reversed on the second prominence; on the two others it was not actually reversed, but the dark line of the sky spectrum all but disappeared close to the limb.
12. 23	121. 32	29		...	24	$\frac{1}{2}$	$\frac{1}{4}$	...	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	...	$\frac{3}{4}$	

1888 GOA MW.	Greenwich Civil Time. 1886.	Position- Angle from Sun's Axis.	Height in Seconds of Arc.				Brightness.				Breadth.				REMARKS.
			C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	
Apr.	^{d h m} 30. 12. 18 12. 33	^{° ' "} 298. 12 300. 2	31 17	} 19	" ...	" ...	$\frac{1}{4}$	$\frac{1}{4}$	...	...	$\frac{1}{2}$	$\frac{1}{3}$	...	...	Bright straight jet. Not seen on F, D ₃ , D ₂ , <i>b</i> , or ¹⁴⁷⁴ K lines with radial slit, but seen on F and ¹⁴⁷⁴ K with the slit tangential. The entire limb of the sun was examined twice with the slit radial and tangential from B to F. With the tangential slit, C, D ₃ , ¹⁴⁷⁴ K and F could be seen on all the prominences, but neither D ₃ , D ₂ nor the <i>b</i> lines could be detected on any of them. The chromosphere averaged 8".5 in height.
May	^{d h m} 1. 11. 25 12. 13 11. 9 12. 15	^{° ' "} 73. 56 75. 31 82. 1 91. 1	17 14 22 14	} 17 14	4 5	14 14	1 2	1 2	... $\frac{1}{2}$	$\frac{1}{2}$ 2	$\frac{3}{4}$ $1\frac{1}{4}$	$\frac{2}{3}$ 1	... 1	1 1	Fine straight jet, not seen in a previous search. Long, low, and brilliant prominence. The C and F lines were displaced towards the blue by about $\frac{1}{3}$ tenth-metre, indicating a motion of approach of about 11 miles per second. The <i>b</i> lines appeared to be reversed to a height of about 5".
	^{d h m} 11. 14 11. 45 11. 16 11. 53 11. 18 11. 56 11. 56 12. 2 11. 19 11. 59 11. 21 12. 5	^{° ' "} 100. 36 109. 26 114. 41 117. 51 118. 51 122. 46 124. 21 125. 41 124. 36 126. 21 268. 46 277. 26	50 48 29 29 50 29 22 22 26 41 29 31	} 48 29 29 22 41 34		48 31	$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{2}$ 2	$\frac{1}{3}$... $\frac{1}{3}$... $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{2}$ $\frac{1}{2}$ 1	... $\frac{1}{5}$ 1	$\frac{2}{3}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{2}$ $1\frac{1}{2}$	$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{2}$ 1		1 $1\frac{1}{2}$	Fine straight jet. Not seen on the F line. Not seen on the F line. Small straight jet, not seen in first search. Not seen on the F line. Not seen on the F line. Fine jet; brilliant; probably a metallic eruption. 12 ^h . 5 ^m . A slight displacement was detected on the upper part of the prominence on the C and F lines. On both lines it was towards the red, and the amount was roughly $\frac{1}{4}$ tenth-metre on F, and $\frac{1}{3}$ tenth-metre on C, indicating a motion of recession of about 9 $\frac{1}{2}$ miles per second. The prominence had changed its shape since the first search, a second jet having sprung up, forming with the first jet a complete arch. The above observations of the C and F lines were taken on the first jet. The extreme point of the arch on the second jet was 41" in height. The entire limb of the sun was examined twice with the slit radial.	
May	^{d h m} 3. 11. 3 11. 17 11. 5 11. 19	^{° ' "} 123. 24 125. 12 126. 2 127. 52	31 29 29 34	} 29 34	... 2	29 34	$\frac{1}{4}$ 1	$\frac{1}{5}$ $\frac{2}{3}$	... $\frac{1}{10}$	$\frac{1}{10}$ $\frac{1}{4}$	$\frac{1}{3}$ $\frac{2}{3}$	$\frac{1}{4}$ $\frac{2}{3}$	... 1	1 1	Straight jet. Straight jet. The entire limb of the sun was examined twice with the slit radial. The chromosphere averaged 8".5 in height. The sun was in white haze, and its limb was boiling.
May	^{d h m} 6. 12. 5 12. 17	^{° ' "} 48. 18 49. 37	19 17	} 17	2	14	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{4}$	$\frac{1}{3}$	1	1	A small straight jet. This prominence was the only one which could be examined on any other line but C.

4 POSITION-ANGLES AND HEIGHTS OF SOLAR PROMINENCES, OBSERVED WITH THE SPECTROSCOPE, AND OBSERVATIONS

Greenwich Civil Time, 1886.	Position- Angle from Sun's Axis.	Height in Seconds of Arc.				Brightness.				Breadth.				REMARKS.
		C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	
May	d h m													
	6. 12. 7	{ 64. 36 }	12	...	...	...	...	...	...	...	...	...	...	Chromosphere a little higher than usual, and feathery.
	12. 8	{ 66. 57 }	19	...	...	...	...	...	...	...	...	...	...	Straight jet.
	12. 10	{ 88. 17 }	79	...	...	...	...	...	...	...	...	...	...	Fine prominence. Partly detached.
		{ 89. 42 }												The entire limb of the sun was examined once with slit radial, on the C line only. The sun was in much haze.
		{ 128. 17 }												
		{ 132. 2 }												
May	7. 11. 50	48. 10	19	{ 24	...	$\frac{1}{5}$	$\frac{1}{3}$	...	...	$\frac{1}{2}$	$\frac{1}{5}$	...	...	Straight jet. Lines 1474 K and F not seen.
	12. 19	49. 50	17	{ 26	?	$\frac{1}{5}$	$\frac{1}{4}$	?	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{1}{3}$	?	1	Straight jet.
	11. 51	60. 40	22	{ 31	...	$\frac{1}{5}$	$\frac{1}{4}$	...	...	$\frac{1}{3}$	$\frac{1}{3}$	...	...	Straight jet.
	12. 21	61. 50	19	{ 31	...	$\frac{1}{5}$	$\frac{1}{4}$	...	...	$\frac{1}{3}$	$\frac{1}{3}$	...	...	
	11. 52	63. 0	31	{ 24	...	$\frac{1}{5}$	$\frac{1}{4}$	...	...	$\frac{1}{3}$	$\frac{1}{3}$	...	...	
	12. 26	64. 50	24	{ 14	5	$1\frac{1}{4}$	3	...	1	$1\frac{1}{4}$	1	...	2	Bright prominence. This jet, when first seen, was suspected to be a metallic eruption, from the vividness and breadth of the bright C line. The D ₃ line was seen distinctly bright for 7" on the limb of the sun. The sun was in much white haze, and only a brilliant prominence could have shown through it. The solar spectrum did not seem more than three times as bright as the sky spectrum. It was remarkable that, whereas the D ₃ line is usually fainter and narrower than the C line, in this instance it was brighter and about as broad. Both C and F could be traced about 2" bright on the sun, the narrow pointed dark line appearing to bisect the bright line. At 12h. 33m. both D lines were distinctly reversed 5" in height. 654 K was seen brightly reversed. Height 12", brightness $\frac{1}{2}$; breadth half of the dark C line.
	11. 56	254. 20	17	{ 14	5	$1\frac{1}{4}$	3	...	1	$1\frac{1}{4}$	1	...	2	
	12. 5	257. 10	12	{ 14	5	$1\frac{1}{4}$	3	...	1	$1\frac{1}{4}$	1	...	2	
	11. 57	{ 259. 10 }	17	...	...	...	...	...	...	...	...	...	...	Straight jet.
	12. 0	{ 263. 10 }	14	...	...	...	...	...	...	...	...	...	...	Faint jet; could not be observed on any other line but C.
		{ 295. 10 }												The entire limb of the sun was examined twice with the slit radial.
		{ 296. 40 }												
Nov.	4. 12. 48	{ 53. 48 }	24	...	...	...	...	...	...	...	...	...	...	Straight jet. Not seen in second search.
	12. 52	{ 56. 2 }	34	...	...	...	...	...	...	...	...	...	...	Partly detached. The sun was in much haze at the second examination. Seen only on the C line.
	13. 19	{ 80. 27 }	34	...	...	...	...	...	...	...	...	...	...	Bright prominence. Partly detached. The D ₃ , D ₂ , b ₁ , b ₂ lines were reversed 2 $\frac{1}{2}$ " in height. Sun in haze at second examination. Seen only on C line.
	12. 54	86. 45	36	{ 34	2	$\frac{1}{5}$	$\frac{1}{2}$	...	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	...	1	Bright straight jet. The sky clouded over before a second examination could be made.
	13. 20	88. 0	34	{ 34	2	$\frac{1}{5}$	$\frac{1}{2}$	...	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{2}$	...	1	Bending over towards the North.
	12. 55	98. 38	55	...	...	...	...	...	...	...	...	...	...	Faint jet.
	13. 24	{ 104. 40 }	29	...	...	...	...	...	...	...	...	...	...	The entire limb of the Sun was examined once with the slit radial on the C line and part of the limb a second time on the entire spectrum from B to F.
	12. 57	{ 123. 50 }	19	...	...	...	...	...	...	...	...	...	...	
	12. 58	{ 125. 58 }	19	...	...	...	...	...	...	...	...	...	...	
	12. 58	{ 126. 44 }	19	...	...	...	...	...	...	...	...	...	...	
	13. 0	{ 128. 2 }	19	...	...	...	...	...	...	...	...	...	...	
		{ 245. 30 }												
		{ 249. 0 }												

1886 May 6 Greenwich Civil Time, 1886.

	Greenwich Civil Time, 1886.	Position-Angle from Sun's Axis.	Height in Seconds of Arc.				Brightness.				Breadth.				REMARKS.
			C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	
Dec.	d h m														
	1. 11. 1	{ 233. 30 236. 7	24 26	{ 26 ...	17	$\frac{1}{3}$	$\frac{1}{4}$	...	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{1}{3}$	...	1		Straight jet.
	11. 3	{ 246. 7 248. 7	24 24	{ 26 ...	24	$\frac{1}{2}$	$\frac{1}{4}$	...	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{2}$	...	1		Straight jet.
	11. 16	{ 312. 27 314. 0	34 34	{	...	$\frac{1}{10}$	...	...	...	$\frac{1}{2}$	...	...	...		Faint prominence. Seen on no other line but C. Not seen in first search. The entire limb of the Sun was examined twice with the slit radial.

OBSERVATION of the SPECTRUM of a Sun Spot made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1886.

SPOT-GROUP, No. 1880.

1886, May 6.

A fine group of spots was seen near the centre of the sun, and these, as examined on the C and F lines, showed a remarkable uprush of bright hydrogen. The F line in particular was reversed in places scattered over the entire area of the group, but it was especially brilliant over the principal spot of the group. Over the nucleus of this spot the F line was greatly broadened, being quite three times its usual breadth, and being seen both as a dark and as a bright line. The dark portion appeared to be displaced about $\frac{1}{3}$ tenth-metre towards the red, corresponding to a motion of recession, or a downward motion, of about 13 miles per second. The bright portion appeared to be displaced by about the same amount towards the blue, corresponding to a similar motion of approach, or an upward motion. The bright part of the line was in the shape of a crescent, of which the convex side was turned away from the mean place of the F line, and towards the violet. In some parts of the spot the F line had a peculiar appearance, the bright line being narrower than the dark line, and lying diagonally across it, inclined to it at a small angle. The C line was reversed over a more extensive area even than F, but did not show displacement or twisting so well.

Amongst the dark lines observed to be broadened over the spot were the following :—

D₁, D₂, Sodium, more than double their usual breadth.

b₁, b₂, b₄, Magnesium

λ 4890, 4891, Iron

λ 4918, 4920, do.

λ 6492, Calcium

λ 6462, do.

λ 6438, do.

λ 6161, do.

λ 6121, do.

λ 6101, do.

} Double their usual breadth.

D₃ and ¹⁴⁷⁴K were not noticeably affected in any way.

The above observations were made by Mr. Maunder with the half-prism Spectroscope mounted on the South-East Equatoreal. The Spectroscope was used in the reversed position, with a train of two half-prisms, giving under these conditions a dispersion of about 6° from A to H, the spectrum being very pure. A power of about 28 was used on the viewing telescope.

The number of the spot-group is taken from the Photographic Results.

1886, May 7.

The same group of spots was again examined with the Spectroscope arranged as on May 6, but no indication of reversal of any of the lines was detected, nor were any lines noticeably broadened. Observer: Mr. Maunder.

MEASURES of DISPLACEMENT of LINES in the SPECTRA of STARS, MOON, AND PLANETS 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 1886.

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_4 as compared with the wavelength measure.

$1^{rev.}$ of the micrometer corresponds with one "half-prism" to $10\cdot4$ tenth-metres or 375 miles per second for the b lines, and to $7\cdot91$ tenth-metres or 304 miles per second for the F line.

$1^{rev.}$ of the screw for opening the slit corresponds to $0\cdot01$ 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, 1886, 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 16. ^h 17. ^m 41	M	Venus	F	$0\cdot150$	$-0\cdot044$	$-\frac{1}{5}$		$-13\cdot4$	$-11\cdot6$	Calculated motion $-6\cdot7$ miles per second. Position Circle, 169° .
17. 44	M	"	F	$0\cdot150$	$-0\cdot027$	$-\frac{1}{10}$		$-8\cdot2$	$-5\cdot8$	
17. 47	M	"	F	$0\cdot150$	$-0\cdot008$	$-\frac{1}{20}$		$-2\cdot4$	$-2\cdot9$	
17. 50	M	"	F	$0\cdot150$	$-0\cdot058$	$-\frac{1}{3}$		$-17\cdot6$	$-19\cdot4$	
17. 54	M	"	F	$0\cdot150$	$-0\cdot027$	$-\frac{1}{4}$		$-8\cdot2$	$-14\cdot5$	
17. 57	M	"	F	$0\cdot150$	$-0\cdot020$	$-\frac{1}{4}$		$-6\cdot1$	$-14\cdot5$	
18. 1	M	"	F	$0\cdot150$	$-0\cdot008$	$-\frac{1}{10}$		$-2\cdot4$	$-5\cdot8$	
18. 4	M	"	F	$0\cdot150$	$-0\cdot029$	$-\frac{1}{20}$		$-8\cdot8$	$-2\cdot9$	
18. 8	M	"	F	$0\cdot150$	$0\cdot000$	0		$0\cdot0$	$0\cdot0$	
18. 11	M	"	F	$0\cdot150$	$-0\cdot002$	0		$-0\cdot6$	$0\cdot0$	
Jan. 18. 22. 28	N	Moon	F	$0\cdot150$	$-0\cdot015$			$-4\cdot6$		The coincidence of the two spectra appeared perfect. Spectrum bright and fairly steady. Star-line fairly distinct. Position Circle, 186° .
22. 31	N	"	F	$0\cdot150$	$+0\cdot037$			$+11\cdot3$		
22. 35	N	"	F	$0\cdot150$	$+0\cdot027$			$+8\cdot2$		
22. 38	N	"	F	$0\cdot150$	$-0\cdot017$			$+5\cdot1$		
23. 3	N	Procyon	F	$0\cdot150$	$+0\cdot012$	0	$+1\cdot5$	$+2\cdot1$	$-1\cdot5$	
23. 8	N	"	F	$0\cdot150$	$+0\cdot015$	0	$+1\cdot5$	$+3\cdot1$	$-1\cdot5$	
23. 18	N	"	F	$0\cdot150$	$-0\cdot009$	0	$+1\cdot5$	$-4\cdot2$	$-1\cdot5$	
Jan. 19. 22. 4	M	Sirius	F	$0\cdot150$	$-0\cdot020$	$-\frac{1}{10}$	$+4\cdot4$	$-10\cdot5$	$-10\cdot2$	Spectrum very tremulous. Star seen through cloud. Position Circle, 186° .
22. 24	M	"	F	$0\cdot150$	$-0\cdot041$	$-\frac{1}{5}$	$+4\cdot4$	$-16\cdot8$	$-16\cdot0$	
Jan. 27. 18. 8	M	Venus	F	$0\cdot201$	$-0\cdot074$	$-\frac{1}{3}$		$-22\cdot5$	$-16\cdot0$	Spectrum bright but tremulous. The later observations were made under more satisfactory conditions than the earlier; the line in the spectrum of Venus being very distinctly seen during the last seven observations. Calculated motion, $-5\cdot4$ miles per second.
18. 10	M	"	F	$0\cdot201$	$-0\cdot158$	$-\frac{1}{2}$		$-48\cdot0$	$-24\cdot0$	
18. 11	M	"	F	$0\cdot201$	$-0\cdot026$	$-\frac{1}{10}$		$-7\cdot9$	$-4\cdot8$	
18. 13	M	"	F	$0\cdot201$	$-0\cdot003$	0		$-0\cdot9$	$0\cdot0$	
18. 15	M	"	F	$0\cdot201$	$-0\cdot017$	0		$-5\cdot1$	$0\cdot0$	
18. 17	M	"	F	$0\cdot201$	$-0\cdot022$	$-\frac{1}{10}$		$-6\cdot7$	$-4\cdot8$	
18. 18	M	"	F	$0\cdot201$	$-0\cdot034$	$-\frac{1}{3}$		$-10\cdot3$	$-9\cdot6$	

Date, 1886. 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. 27. 18. 20	M	Venus	F	0.201	-0.063	- $\frac{1}{5}$		-19.1	-9.6	
18. 21	M	,,	F	0.201	-0.054	- $\frac{1}{7}$		-16.4	-6.9	
18. 23	M	,,	F	0.201	+0.002	0		+0.6	0.0	
18. 59	M	α Pegasi	F	0.154	-0.051	- $\frac{1}{10}$	+12.4	-27.9	-19.0	Spectrum very faint and tremulous.
19. 2	M	,,	F	0.154	+0.001	0	+12.4	-12.1	-12.4	Measures made with great difficulty.
19. 6	M	,,	F	0.154	-0.084	- $\frac{1}{3}$	+12.4	-37.9	-34.3	
19. 9	M	,,	F	0.154	-0.155	- $\frac{2}{5}$	+12.4	-59.5	-38.7	
19. 14	M	α Andromedæ	F	0.154	-0.073	- $\frac{1}{4}$	+15.4	-37.6	-31.8	Spectrum fairly steady.
19. 18	M	,,	F	0.154	-0.001	0	+15.4	-15.1	-15.4	
19. 41	M	β Persei	F	0.154	-0.139	- $\frac{1}{3}$	+16.8	-59.0	-49.6	Spectrum fairly bright and steady. Defi-
19. 46	M	,,	F	0.154	-0.081	- $\frac{2}{5}$	+16.8	-41.4	-43.1	nition fair.
19. 49	M	α Persei	F	0.154	-0.140	- $\frac{2}{5}$	+15.1	-57.6	-41.4	Spectrum fairly bright and steady. Defi-
19. 56	M	,,	F	0.154	-0.030	- $\frac{1}{5}$	+15.1	-24.2	-28.2	nition fair.
20. 10	M	Aldebaran	F	0.154	+0.064	+ $\frac{1}{4}$	+16.3	+3.1	+0.1	
20. 15	M	,,	F	0.154	+0.194	+ $\frac{3}{7}$	+16.3	+42.6	+16.5	
20. 35	M	Rigel	F	0.154	+0.103	+ $\frac{3}{5}$	+12.9	+18.4	+9.0	Spectrum bright but tremulous. Star-line
20. 40	M	,,	F	0.154	+0.183	+ $\frac{3}{5}$	+12.9	+42.7	+26.5	seen fairly well.
20. 42	M	γ Orionis	F	0.154	+0.113	+ $\frac{1}{3}$	+13.6	+20.7	+8.3	Spectrum bright but tremulous. Star-line
20. 45	M	,,	F	0.154	+0.009	0	+13.6	-10.9	-13.6	seen very well.
20. 49	M	β Tauri	F	0.154	-0.088	- $\frac{2}{5}$	+13.8	-40.5	-40.1	Spectrum bright and steady. Star-line
20. 55	M	,,	F	0.154	-0.071	- $\frac{1}{3}$	+13.8	-35.4	-35.7	seen fairly well.
21. 1	M	δ Orionis	F	0.154	+0.109	+ $\frac{1}{3}$	+12.7	+20.4	+13.6	Spectrum somewhat faint and tremulous,
21. 4	M	,,	F	0.154	+0.026	+ $\frac{1}{10}$	+12.7	-4.8	-6.1	but star-line seen fairly well.
21. 8	M	ϵ Orionis	F	0.154	+0.081	+ $\frac{1}{10}$	+12.4	+12.2	+7.3	Spectrum somewhat faint and tremulous,
21. 13	M	,,	F	0.154	+0.098	+ $\frac{2}{10}$	+12.4	+17.4	+7.3	but star-line seen fairly well.
21. 17	M	ζ Orionis	F	0.154	+0.072	+ $\frac{2}{5}$	+12.1	+9.8	+14.2	Spectrum somewhat faint and tremulous,
21. 21	M	,,	F	0.154	+0.094	+ $\frac{2}{5}$	+12.1	+16.5	+14.2	but star-line seen fairly well.
21. 24	M	κ Orionis	F	0.154	-0.078	- $\frac{1}{4}$	+10.9	-34.6	-27.3	Spectrum faint and tremulous, but star-
21. 27	M	,,	F	0.154	+0.009	0	+10.9	-8.2	-10.9	line seen fairly well.
21. 32	M	γ Geminorum	F	0.154	-0.335	-1	+9.5	-111.3	-75.1	Spectrum bright and steady. The star-line
21. 35	M	,,	F	0.154	-0.217	- $\frac{4}{5}$	+9.5	-75.4	-62.0	is broad, diffused and difficult to bisect.
21. 37	M	,,	F	0.154	-0.032	- $\frac{1}{4}$	+9.5	-19.2	-25.9	It was seen fairly well on this occasion,
21. 40	M	,,	F	0.154	+0.006	0	+9.5	-7.7	-9.5	and the difficulty of bisection was due
21. 42	M	,,	F	0.154	-0.075	- $\frac{2}{5}$	+9.5	-32.3	-35.8	simply to its nebulous character.
21. 45	M	,,	F	0.154	-0.110	- $\frac{2}{5}$	+9.5	-42.9	-35.8	
21. 48	M	Sirius	F	0.154	-0.172	- $\frac{2}{3}$	+6.3	-58.6	-50.0	Direct comparison showed a displacement
21. 50	M	,,	F	0.154	-0.106	- $\frac{2}{5}$	+6.3	-38.5	-45.7	of about half the breadth of the com-
21. 52	M	,,	F	0.154	-0.059	- $\frac{3}{10}$	+6.3	-24.2	-26.0	parison-line towards the blue, equivalent
21. 54	M	,,	F	0.154	-0.103	- $\frac{1}{2}$	+6.3	-37.6	-39.1	to a motion of approach of 39.1 miles
21. 56	M	,,	F	0.154	-0.021	- $\frac{1}{10}$	+6.3	-12.7	-12.9	per second.
21. 58	M	,,	F	0.154	-0.059	- $\frac{1}{5}$	+6.3	-24.2	-19.4	
22. 9	M	Capella	F	0.154	-0.012	- $\frac{1}{10}$	+12.9	-16.5	-19.5	Spectrum bright and steady. The star-line,
22. 11	M	,,	F	0.154	+0.057	+ $\frac{3}{10}$	+12.9	+4.4	+6.8	which is rather faint, was seen with
22. 13	M	,,	F	0.154	+0.058	+ $\frac{1}{4}$	+12.9	+4.7	+3.5	unusual distinctness.
22. 15	M	,,	F	0.154	+0.014	+ $\frac{1}{10}$	+12.9	-8.6	-6.3	
22. 21	M	β Aurigæ	F	0.154	-0.065	- $\frac{2}{5}$	+11.3	-31.0	-37.6	Spectrum faint and tremulous. Star-line
22. 25	M	,,	F	0.154	-0.094	- $\frac{1}{2}$	+11.3	-39.9	-44.1	ill-defined.
22. 31	M	Castor	F	0.154	-0.126	+ $\frac{1}{3}$	+6.2	+32.1	+37.5	Spectrum tremulous. Star-line very ill-
22. 35	M	,,	F	0.154	-0.106	+ $\frac{1}{3}$	+6.2	+26.0	+26.6	defined.
22. 39	M	Pollux	F	0.154	-0.110	- $\frac{2}{3}$	+5.3	-38.7	-49.0	Spectrum bright and steady. Definition
22. 45	M	,,	F	0.154	-0.152	- $\frac{3}{4}$	+5.3	-51.5	-54.5	good. Star-line seen well. Displacement
22. 49	M	Procyon	F	0.154	-0.068	- $\frac{2}{5}$	+4.4	-25.1	-30.7	evidently large and towards the blue.
22. 51	M	,,	F	0.154	-0.010	- $\frac{1}{10}$	+4.4	-7.4	-11.0	Spectrum bright and steady. Definition
22. 53	M	,,	F	0.154	-0.016	- $\frac{1}{10}$	+4.4	-9.3	-11.0	good. But the star-line from its peculiar
22. 55	M	,,	F	0.154	+0.016	+ $\frac{1}{10}$	+4.4	+0.5	+2.2	character was difficult to observe. The
22. 57	M	,,	F	0.154	-0.092	- $\frac{1}{3}$	+4.4	-32.4	-26.3	displacement was evidently very small.
22. 59	M	,,	F	0.154	-0.016	0	+4.4	-9.3	-4.4	
Jan. 28. 12. 29	M	Sky	F	0.154	-0.002			-0.6		Position Circle, 186°.
12. 34	M	,,	F	0.154	+0.021			+6.4		The sky spectrum was seen very well. The
12. 38	M	,,	F	0.154	+0.010			+3.0		coincidence of the two spectra appeared
12. 41	M	,,	F	0.154	-0.003			-0.9		perfect.
12. 45	M	,,	F	0.154	-0.007			-2.1		
										Position Circle, 186°.

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

Date, 1886. 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 h m} 28. 21. 59	N	Procyon.....	F	0'154	+0'002	0	+ 4'7	- 4'1	- 4'7	Position Circle, 186°.
Feb. 1. 18. 49	M	α Pegasi.....	F	0'104	-0'017	- $\frac{1}{10}$	+ 11'2	- 16'3	- 15'8	Star low. Spectrum faint and very
18. 55	M	,,	F	0'104	-0'145	- $\frac{1}{2}$	+ 11'2	- 55'2	- 34'4	tremulous. Definition bad. Measures
19. 3	M	γ Pegasi	F	0'104	+0'025	- $\frac{2}{3}$	+ 15'0	- 7'4	+ 3'6	rough.
19. 8	M	,,	F	0'104	+0'031	0	+ 15'0	- 5'6	- 15'0	Spectrum faint and tremulous. Definition
19. 13	M	α Andromedæ.	F	0'104	-0'228	- $\frac{2}{3}$	+ 14'7	- 83'9	- 45'7	bad. Star-line seen with great difficulty.
19. 18	M	,,	F	0'104	-0'171	- $\frac{2}{3}$	+ 14'7	- 66'7	- 42'6	Wind high. Spectrum fairly bright but
19. 23	M	β Arietis	F	0'104	-0'188	- $\frac{1}{2}$	+ 18'4	- 75'5	- 41'6	tremulous. Definition poor.
19. 28	M	,,	F	0'104	-0'253	- $\frac{2}{3}$	+ 18'4	- 95'2	- 49'4	Wind very high. Spectrum tremulous.
19. 43	M	β Persei	F	0'104	-0'037	- $\frac{1}{2}$	+ 17'1	- 28'4	- 32'6	Definition bad.
19. 48	M	,,	F	0'104	-0'038	- $\frac{1}{4}$	+ 17'1	- 28'7	- 28'7	Spectrum fairly bright and steady. Defini-
19. 55	M	α Persei	F	0'104	-0'005	- $\frac{1}{10}$	+ 15'6	- 17'1	- 20'2	tion fair.
20. 1	M	,,	F	0'104	-0'032	- $\frac{1}{3}$	+ 15'6	- 25'3	- 31'1	Spectrum fairly bright but tremulous.
20. 13	M	Rigel	F	0'104	+0'071	+	+ 13'7	+ 7'9	+ 4'9	Definition poor.
20. 21	M	,,	F	0'104	+0'055	+	+ 13'7	+ 3'0	- 4'4	Wind very high. Spectrum bright but
20. 25	M	γ Orionis	F	0'104	+0'138	+	+ 14'6	+ 28'2	+ 21'2	tremulous. Star-line seen with great
20. 30	M	,,	F	0'104	-0'056	- $\frac{2}{3}$	+ 14'6	- 30'7	- 29'2	difficulty.
20. 33	M	β Tauri	F	0'104	-0'029	- $\frac{1}{2}$	+ 14'8	- 23'6	- 24'1	Wind very high. Spectrum fairly bright
20. 39	M	,,	F	0'104	-0'041	- $\frac{1}{4}$	+ 14'8	- 27'2	- 26'4	but tremulous. Definition bad.
20. 42	M	γ Geminorum .	F	0'104	-0'168	- $\frac{2}{3}$	+ 10'9	- 61'9	- 41'9	Wind very high. Spectrum bright but
20. 48	M	,,	F	0'104	-0'048	- $\frac{1}{3}$	+ 10'9	- 25'5	- 26'4	tremulous. Definition bad.
Feb. 2. 12. 0	M	Sky.....	F	0'104	+0'024			+ 7'3		Position Circle, 6°.
12. 4	M	,,	F	0'104	+0'005			+ 1'5		The coincidence of the two spectra appeared
12. 7	M	,,	F	0'104	+0'026			+ 7'9		perfect.
12. 11	M	,,	F	0'104	-0'012			- 3'6		
12. 15	M	,,	F	0'104	+0'010			+ 3'0		
March 3. 19. 55	M	Rigel	F	0'190	+0'078	+ $\frac{1}{2}$	+ 16'0	+ 7'7	+ 5'3	Spectrum fairly bright and steady but
19. 59	M	,,	F	0'190	+0'155	+ $\frac{1}{3}$	+ 16'0	+ 31'1	+ 12'3	definition poor. Star-line seen with
20. 10	M	γ Orionis	F	0'190	+0'040	+ $\frac{1}{10}$	+ 17'8	- 5'7	- 9'3	great difficulty.
20. 13	M	,,	F	0'190	+0'119	+ $\frac{1}{2}$	+ 17'8	+ 18'3	+ 10'5	Spectrum faint but fairly steady. Definition
20. 20	M	β Tauri	F	0'190	-0'090	- $\frac{1}{3}$	+ 18'4	- 45'7	- 46'7	poor. Star-line seen with great difficulty.
20. 24	M	,,	F	0'190	+0'060	+ $\frac{1}{10}$	+ 18'4	- 0'2	- 9'9	Spectrum fairly bright and steady but
20. 26	M	,,	F	0'190	-0'086	- $\frac{1}{2}$	+ 18'4	- 44'5	- 39'7	definition poor.
20. 29	M	,,	F	0'190	-0'056	- $\frac{1}{10}$	+ 18'4	- 35'4	- 43'9	
20. 40	M	Aldebaran.....	F	0'190	+0'198	+ $\frac{1}{2}$	+ 18'5	+ 41'6	+ 24'0	Spectrum bright and fairly steady, but
20. 43	M	,,	F	0'190	+0'087	+ $\frac{1}{4}$	+ 18'5	+ 7'9	+ 2'8	definition poor. Star-line faint.
20. 52	M	Capella	F	0'190	-0'102	- $\frac{1}{2}$	+ 17'1	- 48'1	- 45'4	Spectrum bright. Definition fair. The
20. 56	M	,,	F	0'190	-0'144	- $\frac{1}{2}$	+ 17'1	- 60'8	- 59'6	displacement was distinctly towards the
21. 0	M	β Aurigæ	F	0'190	-0'170	- $\frac{1}{2}$	+ 16'8	- 68'4	- 59'3	blue. Star line seen fairly well.
21. 4	M	,,	F	0'190	-0'106	- $\frac{1}{2}$	+ 16'8	- 49'0	- 50'8	Spectrum fairly bright and steady. Defini-
21. 37	M	Sirius	F	0'190	+0'035	+ $\frac{1}{10}$	+ 12'6	- 2'0	- 4'1	tion fair.
21. 41	M	,,	F	0'190	-0'057	- $\frac{1}{2}$	+ 12'6	- 29'9	- 29'6	Star in light cloud. Spectrum faint and
21. 43	M	,,	F	0'190	-0'230	- $\frac{1}{2}$	+ 12'6	- 82'4	- 55'1	tremulous. Definition bad.
21. 45	M	,,	F	0'190	-0'064	- $\frac{1}{3}$	+ 12'6	- 32'0	- 40'9	
21. 46	M	,,	F	0'190	-0'060	- $\frac{1}{10}$	+ 12'6	- 30'8	- 38'1	
21. 47	M	,,	F	0'190	-0'138	- $\frac{1}{2}$	+ 12'6	- 54'5	- 46'6	
21. 56	M	Procyon.....	F	0'190	-0'149	- $\frac{1}{2}$	+ 13'6	- 58'9	- 56'1	
21. 58	M	,,	F	0'190	-0'034	- $\frac{1}{2}$	+ 13'6	- 23'9	- 34'9	
22. 0	M	,,	F	0'190	-0'073	- $\frac{1}{10}$	+ 13'6	- 35'8	- 39'1	
22. 2	M	,,	F	0'190	-0'076	- $\frac{1}{2}$	+ 13'6	- 36'7	- 34'9	Position Circle, 6°.

Date, 1886. 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.	
Mar. 4. 12. 0 12. 5 12. 10 12. 15 12. 20	M M M M M	Sky..... ,, ,, ,, ,,	F F F F F	0'190 0'190 0'190 0'190 0'190	+0'007 +0'030 +0'001 +0'007 -0'011			+ 2'1 + 9'1 + 0'3 + 2'1 - 3'3		No want of coincidence between the two spectra could be detected. Position Circle, 6°.
Mar. 17. 20. 0 20. 10 20. 15 20. 25 20. 38 20. 42 21. 35 21. 38 21. 44 21. 46 21. 47 21. 49 21. 50 22. 3 22. 7 22. 10 22. 13	M M M M M M M M M M M M M M M M M M	Aldebaran..... ,, Capella ,, α Orionis ,, Pollux ,, Moon ,, ,, ,, ,, Mars ,, ,, ,, ,,	b ₁ b ₁ b ₁ b ₁ b ₄ b ₄ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁	0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153 0'153	+0'080 +0'085 +0'205 +0'110 +0'182 +0'094 -0'028 -0'039 -0'011 -0'008 -0'016 +0'025 +0'008 +0'058 -0'014 +0'054 +0'017	+ 1/3 + 1/3 + 1/3 + 1/3 + 1/3 + 2/5 - 1/10 - 1/4 - 1/10 - 1/10 - 1/10 - 1/10 + 1/4 - 1/20 + 1/4 + 1/20	+ 17'4 + 17'4 + 16'9 + 16'9 + 17'8 + 17'8 + 16'8 + 16'8 - 4'1 - 3'0 - 6'0 + 9'4 + 3'0 + 21'8 - 5'3 + 20'3 + 6'4	+ 12'6 + 14'5 + 60'1 + 24'4 + 50'5 + 17'5 + 33'0 - 27'3 - 31'5 - 4'1 - 3'0 - 6'0 + 9'4 + 3'0 + 31'7 - 6'4 + 31'7 + 6'4		Spectrum faint and tremulous. Definition poor. Star-lines seen with difficulty. Spectrum bright but tremulous. Definition poor. Star-lines seen with difficulty. Spectrum fairly steady; b ₁ could not be distinctly seen, but b ₄ was very distinct. Spectrum faint but fairly steady. Star-line faint but seen fairly well now and then. The coincidence of the two spectra appeared perfect. Spectrum faint. The line in the spectrum of the planet was faint, but fairly well defined. Calculated motion + 2'0 miles per second. Position Circle, 6°.
Mar. 23. 21. 8 21. 15 22. 27 22. 33 22. 55 23. 0 23. 5 23. 10	N N N N N N N N	Capella ,, Pollux ,, Mars ,, ,, ,,	b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁	0'190 0'190 0'190 0'190 0'190 0'190 0'190 0'190	-0'013 -0'009 -0'006 -0'031 -0'066 -0'018 +0'010 +0'010	0 0 0 - 1/8 - 1/4 - 1/10 0 0	+ 16'6 + 16'6 + 17'4 + 17'4 - 24'8 - 6'8 + 3'8 + 3'8	- 21'5 - 20'0 - 19'6 - 29'0 - 25'6 - 10'3 0'0 0'0		Spectrum tremulous. Star-line very faint. Star-line seen fairly well at intervals. Mist rendered measurement difficult. The line in the spectrum of the planet was faint. Calculated motion + 3'3 miles per second. Position Circle, 186°.
Mar. 24. 12. 10 12. 14 12. 17	N N N	Sky..... ,, ,,	b ₁ b ₁ b ₁	0'190 0'190 0'190	-0'009 -0'010 -0'001			- 3'4 - 3'8 - 0'4		The coincidence of the two spectra appeared perfect. Position Circle, 186°.
April 6. 21. 30 21. 40 22. 15 22. 25 22. 40 22. 50 23. 0 23. 5 23. 17 23. 25 23. 40 23. 45	N N N N N N N N N N N N	Capella ,, Procyon..... ,, Castor..... ,, ,, ,, Pollux..... ,, Mars ,,	F F F F F F F F F F F F	0'218 0'218 0'218 0'218 0'218 0'218 0'218 0'218 0'218 0'218 0'218 0'218	+0'052 +0'057 -0'036 +0'010 +0'010 -0'031 +0'041 +0'021 -0'042 -0'040 +0'005 +0'010	+ 1/4 + 1/4 - 1/5 + 1/20 + 1/20 - 1/6 + 1/6 + 1/10 - 1/5 - 1/5 0 + 1/20	+ 15'1 + 15'1 + 17'5 + 17'5 + 18'0 + 18'0 + 18'0 + 18'0 + 18'1 + 18'1 + 1'5 + 3'0	+ 0'7 + 2'2 - 28'4 - 14'5 - 15'0 - 27'4 - 5'6 - 11'6 - 30'8 - 30'2 0'0 + 3'0	- 0'4 - 0'4 - 29'3 - 14'5 - 15'0 - 27'8 - 8'2 - 12'1 - 29'9 - 29'9 0'0 + 3'0	Spectrum tremulous. Star-line diffused and ill-defined. Spectrum tremulous. Star-line faint. Calculated motion + 5'6 miles per second. Position Circle, 6°.
Apr. 22. 22. 45	N	Mars	F	0'137	+0'006	0		+ 1'8	0'0	Spectrum tremulous. The line in the spectrum of the planet faint and indistinct. Measure rough. Calculated motion + 7'3 miles per second. Position Circle, 6°.

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

Date, 1886. 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.	
Apr. 30. ^{d h m} 21. 30	N	Regulus.....	F	0'175	+0'001	0	+ 17'2	- 16'9	- 17'2	Calculated motion + 7'8 miles per second.
21. 38	N	,,	F	0'175	-0'001	0	+ 17'2	- 17'5	- 17'2	
22. 5	N	Mars.....	F	0'175	+0'017	+ $\frac{1}{30}$		+ 5'1	+ 4'0	
22. 13	N	,,	F	0'175	+0'017	+ $\frac{1}{30}$		+ 5'1	+ 4'0	
22. 40	N	β Leonis.....	F	0'175	-0'067	- $\frac{1}{4}$	+ 13'6	- 34'0	- 33'6	
22. 45	N	,,	F	0'175	-0'044	- $\frac{1}{6}$	+ 13'6	- 27'0	- 26'9	
23. 20	N	Spica	F	0'175	-0'020	- $\frac{1}{30}$	+ 5'7	- 11'8	- 9'7	
23. 25	N	,,	F	0'175	-0'051	- $\frac{1}{6}$	+ 5'7	- 21'2	- 21'7	
23. 45	N	Arcturus	F	0'175	-0'041	- $\frac{1}{6}$	+ 4'8	- 17'2	- 18'1	
23. 50	N	,,	F	0'175	-0'066	- $\frac{1}{4}$	+ 4'8	- 24'8	- 24'8	
Position Circle, 6°.										
May 1. 21. 0	M	Procyon.....	F	0'065	+0'012	+ $\frac{1}{30}$	+ 16'6	- 13'0	- 9'5	Spectrum faint and very tremulous. Bi-section difficult and uncertain.
21. 10	M	,,	F	0'065	-0'284	- $\frac{1}{3}$	+ 16'6	- 102'8	- 73'0	
21. 25	M	Pollux.....	F	0'065	-0'078	- $\frac{2}{3}$	+ 16'9	- 40'6	- 45'1	Spectrum and star-line faint. Measures made with great difficulty.
21. 35	M	,,	F	0'065	-0'112	- $\frac{2}{3}$	+ 16'9	- 50'9	- 45'1	
21. 50	M	Castor.....	F	0'065	+0'116	+ $\frac{1}{3}$	+ 16'4	+ 18'9	+ 7'1	Spectrum faint but definition good.
22. 0	M	,,	F	0'065	+0'154	+ $\frac{1}{3}$	+ 16'4	+ 30'4	+ 18'9	
22. 35	M	β Ursæ Majoris	F	0'065	+0'112	+ $\frac{1}{3}$	+ 12'7	+ 21'3	+ 10'8	Spectrum faint. Measures made with great difficulty.
22. 45	M	,,	F	0'065	+0'009	0	+ 12'7	- 10'0	- 12'7	
23. 5	M	α Ursæ Majoris	F	0'140	-0'112	- $\frac{1}{3}$	+ 11'7	- 45'7	- 41'0	Spectrum fairly bright, but star-line very faint and difficult to see.
23. 15	M	,,	F	0'140	-0'204	- $\frac{2}{3}$	+ 11'7	- 73'7	- 64'4	
23. 30	M	γ Ursæ Majoris	F	0'140	-0'015	- $\frac{1}{30}$	+ 11'7	- 16'3	- 16'1	Star-line very ill-defined.
23. 40	M	,,	F	0'140	+0'100	+ $\frac{1}{3}$	+ 11'7	+ 18'7	+ 17'6	
23. 50	M	ϵ Ursæ Majoris	F	0'140	+0'046	+ $\frac{1}{6}$	+ 9'5	+ 4'5	+ 8'0	Star-line very ill-defined.
23. 55	M	,,	F	0'140	-0'017	- $\frac{1}{30}$	+ 9'5	- 14'6	- 13'9	
2. 0. 15	M	ζ Ursæ Majoris	F	0'140	+0'075	+ $\frac{1}{4}$	+ 8'4	+ 14'4	+ 13'6	Spectrum bright and definition fair, but star-line broad and diffused.
0. 25	M	,,	F	0'140	+0'023	+ $\frac{1}{10}$	+ 8'4	- 1'4	+ 0'4	
Position Circle, 6°.										
May 3. 10. 10	M	Sky.....	F	0'140	-0'030			- 9'1		The coincidence of the two spectra appeared perfect.
10. 15	M	,,	F	0'140	-0'021			- 6'4		
10. 20	M	,,	F	0'140	+0'036			+ 10'9		
10. 25	M	,,	F	0'140	+0'001			+ 0'3		
10. 30	M	,,	F	0'140	+0'005			+ 1'5		
Position Circle, 6°.										
May 3. 23. 40	M	Regulus.....	F	0'135	+0'100	+ $\frac{1}{2}$	+ 17'5	+ 12'9	+ 19'4	Spectrum bright but tremulous. Star-line diffused but seen fairly well.
23. 50	M	,,	F	0'135	+0'027	+ $\frac{1}{10}$	+ 17'5	- 9'3	- 10'1	
4. 0. 0	M	Mars	F	0'135	-0'021	- $\frac{1}{10}$		- 6'4	- 7'4	Spectrum bright and steady, definition fair.
0. 5	M	,,	F	0'135	-0'056	- $\frac{1}{3}$		- 17'0	- 14'7	
0. 10	M	,,	F	0'135	+0'009	0		+ 2'7	0'0	Calculated motion + 8'0 miles per second.
0. 15	M	,,	F	0'135	-0'027	- $\frac{1}{10}$		- 8'2	- 7'4	
0. 30	M	β Leonis	F	0'135	+0'025	+ $\frac{1}{10}$	+ 14'2	- 6'6	- 6'8	Spectrum fairly bright and steady. Star-line very diffused but seen fairly well.
0. 40	M	,,	F	0'135	-0'003	0	+ 14'2	- 15'1	- 14'2	
1. 0	M	γ Virginis	F	0'135	-0'130	- $\frac{1}{2}$	+ 10'3	- 49'8	- 47'2	Spectrum fairly bright and steady. Star-line broad and diffused but seen fairly well.
1. 10	M	,,	F	0'135	-0'089	- $\frac{1}{3}$	+ 10'3	- 37'3	- 34'9	
1. 20	M	α Virginis	F	0'135	-0'196	- $\frac{2}{3}$	+ 6'6	- 66'1	- 55'8	Spectrum bright but very tremulous. A large displacement towards the blue was manifest.
1. 30	M	,,	F	0'135	-0'161	- $\frac{2}{3}$	+ 6'6	- 55'5	- 50'9	
1. 45	M	Arcturus	F	0'135	-0'221	- $\frac{2}{3}$	+ 5'5	- 72'6	- 64'6	Spectrum bright. Definition good.
1. 55	M	,,	F	0'135	-0'212	- $\frac{2}{3}$	+ 5'5	- 69'9	- 64'6	
2. 5	M	α Coronæ Bor.	F	0'135	-0'065	- $\frac{1}{3}$	+ 0'7	- 20'4	- 19'2	Star-line very difficult to bisect.
2. 15	M	,,	F	0'135	-0'141	- $\frac{1}{2}$	+ 0'7	- 43'5	- 37'6	
2. 20	M	,,	F	0'135	+0'010	0	+ 0'7	+ 2'3	- 0'7	Position Circle, 6°.
2. 25	M	,,	F	0'135	-0'145	- $\frac{1}{2}$	+ 0'7	- 44'7	- 37'6	

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Date, 1886. 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.	
May 6. 22. 39	N	Regulus	F	0'145	+0'052	+ $\frac{1}{4}$	+ 17'6	- 1'8	+ 2'1	Measures made with difficulty. Position Circle, 6°.
22. 44	N	, ,	F	0'145	-0'030	- $\frac{1}{4}$	+ 17'6	- 26'7	- 28'9	
23. 50	N	Arcturus	F	0'145	-0'060	- $\frac{1}{4}$	+ 6'2	- 24'4	- 25'9	
23. 59	N	, ,	F	0'145	-0'055	- $\frac{1}{6}$	+ 6'2	- 22'9	- 21'9	
May 13. 21. 30	M	Arcturus	F	0'153	-0'086	- $\frac{1}{3}$	+ 7'8	- 33'9	- 41'0	Spectrum bright and fairly steady, but definition poor. Spectrum bright and fairly steady, but definition poor. The coincidence of the two spectra appeared perfect. The observations were interrupted by passing cloud. Spectrum bright but tremulous. The observations were interrupted by passing cloud. Spectrum bright and fairly steady. Definition fair. Spectrum steady and fairly bright. Star-line very well seen. Measures considered good. Spectrum faint. The observations were interrupted by cloud. Position Circle, 6°.
21. 45	M	, ,	F	0'153	-0'093	- $\frac{1}{3}$	+ 7'8	- 36'1	- 37'7	
22. 10	M	α Canum Ven..	F	0'153	-0'072	- $\frac{1}{4}$	+ 11'9	- 33'8	- 36'8	
22. 30	M	, ,	F	0'153	-0'084	- $\frac{1}{4}$	+ 11'9	- 37'4	- 36'8	
22. 50	M	Moon	F	0'153	-0'027			- 8'2		
22. 55	M	, ,	F	0'153	+0'022			+ 6'7		
23. 0	M	, ,	F	0'153	+0'001			+ 0'3		
23. 5	M	, ,	F	0'153	+0'017			+ 5'1		
23. 10	M	, ,	F	0'153	-0'010			- 3'0		
23. 30	M	β Libræ	F	0'153	-0'120	- $\frac{1}{3}$	+ 1'7	- 38'1	- 34'9	
23. 50	M	, ,	F	0'153	-0'032	- $\frac{1}{10}$	+ 1'7	- 11'4	- 11'6	
14. 0. 5	M	α Coronæ Bor.	F	0'153	+0'061	+ $\frac{1}{4}$	+ 2'8	+ 15'7	+ 22'1	
0. 15	M	, ,	F	0'153	+0'042	+ $\frac{1}{5}$	+ 2'8	+ 9'9	+ 17'1	
0. 25	M	β Serpentis ...	F	0'153	-0'027	- $\frac{1}{10}$	+ 1'3	- 9'5	- 11'2	Spectrum steady and fairly bright. Star-line very well seen. Measures considered good.
0. 30	M	, ,	F	0'153	-0'058	- $\frac{1}{5}$	+ 1'3	- 18'9	- 21'2	
0. 45	M	γ Herculis	F	0'153	-0'125	- $\frac{2}{5}$	- 1'1	- 36'9	- 38'8	Spectrum faint. The observations were interrupted by cloud. Position Circle, 6°.
May 15. 21. 20	M	Regulus	F	0'103	+0'024	+ $\frac{1}{10}$	+ 17'9	- 10'6	- 9'6	Spectrum faint and tremulous. Star-line faint and very ill defined. Spectrum fairly bright but tremulous. Definition fair. Displacement evidently large and towards the blue. Star-line dark, very broad and diffused at the edges. Spectrum fairly bright but tremulous. Definition fair. Displacement very small. The coincidence of the two spectra appeared perfect. Position Circle, 6°.
21. 30	M	, ,	F	0'103	+0'060	+ $\frac{1}{4}$	+ 17'9	+ 0'3	+ 2'9	
21. 45	M	δ Leonis	F	0'103	-0'115	- $\frac{2}{5}$	+ 16'8	- 51'7	- 50'1	
22. 0	M	, ,	F	0'103	-0'064	- $\frac{2}{5}$	+ 16'8	- 36'2	- 50'1	
22. 15	M	β Leonis	F	0'103	-0'013	- $\frac{1}{20}$	+ 15'9	- 19'9	- 20'0	
22. 25	M	, ,	F	0'103	+0'021	+ $\frac{1}{10}$	+ 15'9	- 9'5	- 7'6	
23. 35	M	Moon	F	0'103	-0'003			- 0'9		
23. 40	M	, ,	F	0'103	0'000			0'0		
23. 45	M	, ,	F	0'103	-0'001			- 0'3		
23. 50	M	, ,	F	0'103	-0'009			- 2'7		
23. 55	M	, ,	F	0'103	-0'006			- 1'8		
May 18. 22. 35	N	Regulus	F	0'180	+0'045	+ $\frac{1}{5}$	+ 17'9	- 4'2	- 4'2	Star-line diffused and faint.
22. 40	N	, ,	F	0'180	+0'053	+ $\frac{1}{5}$	+ 17'9	- 1'8	- 1'5	Definition poor. Measures rough.
22. 58	N	Spica	F	0'180	+0'004	0	+ 10'5	- 9'3	- 10'5	
23. 3	N	, ,	F	0'180	+0'017	+ $\frac{1}{10}$	+ 10'5	- 5'4	- 2'3	The coincidence of the two spectra appeared fairly exact. Position Circle, 6°.
23. 25	N	Arcturus	F	0'180	-0'114	- $\frac{2}{5}$	+ 8'9	- 43'5	- 41'7	
23. 30	N	, ,	F	0'180	-0'058	- $\frac{1}{5}$	+ 8'9	- 26'5	- 25'3	
23. 50	N	Moon	F	0'180	-0'006			- 1'8		
23. 53	N	, ,	F	0'180	-0'021			- 6'4		
23. 56	N	, ,	F	0'180	+0'005			+ 1'5		
23. 59	N	, ,	F	0'180	+0'003			+ 0'9		
May 20. 22. 15	N	Arcturus	F	0'230	-0'069	- $\frac{1}{5}$	+ 9'3	- 30'3	- 30'9	Star-line very indistinct.
22. 25	N	, ,	F	0'230	-0'044	- $\frac{1}{7}$	+ 9'3	- 22'7	- 24'7	Star-line very broad and dark.
22. 45	N	α Coronæ Bor.	F	0'230	-0'040	- $\frac{1}{10}$	+ 4'2	- 16'3	- 15'0	
22. 50	N	, ,	F	0'230	-0'039	- $\frac{1}{10}$	+ 4'2	- 16'0	- 15'0	The coincidence of the two spectra appeared perfect.
23. 25	N	Moon	F	0'230	-0'028			- 8'5		
23. 28	N	, ,	F	0'230	-0'023			- 7'0		

Date, 1886. 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.	
May ^{d h m} 20. 23. 30 23. 33	N N	Moon..... ,,	F F	^r 0'230 0'230	-0'009 -0'001			- 2'7 - 0'3		Position Circle, 6°.
June 7. 22. 5 22. 20	M M	Arcturus ,,	b ₁ b ₁	0'165 0'165	-0'099 -0'096	- $\frac{3}{10}$ - $\frac{1}{4}$	+ 12'5 + 12'5	- 49'7 - 48'5	- 50'0 - 43'8	Spectrum faint but fairly steady. Star-lines faint and seen with difficulty. Position Circle, 6°.
June 8. 10. 20 10. 21 10. 23 10. 24 10. 25	M M M M M	Sky ,, ,, ,, ,,	b ₁ b ₁ b ₁ b ₁ b ₁	0'165 0'165 0'165 0'165 0'165	+0'030 +0'030 -0'013 +0'019 -0'011			+ 11'3 + 11'3 - 4'9 + 7'1 - 4'1		The coincidence of the two spectra appeared perfect. Position Circle, 6°.
June 15. 23. 0 23. 5 23. 40 23. 42 23. 43 23. 45 16. 0. 15 0. 20 0. 38 0. 50	N N N N N N N N N N N	Arcturus ,, Moon..... ,, ,, ,, γ Ursæ Majoris ,, α Ursæ Majoris ,,	b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁	0'150 0'150 0'150 0'150 0'150 0'150 0'150 0'150 0'150 0'150 0'150	-0'138 -0'095 -0'014 -0'014 -0'023 -0'006 +0'006 +0'037 -0'121 -0'138	- $\frac{1}{2}$ - $\frac{3}{8}$ 0 + $\frac{1}{8}$ - $\frac{1}{2}$ - $\frac{1}{2}$	+ 13'5 + 13'5 + 10'9 + 10'9 + 8'7 + 8'7	- 65'3 - 49'2 - 5'3 - 5'3 - 8'6 - 2'2 - 8'7 + 3'0 - 54'1 - 60'5	- 62'3 - 46'0 - 10'9 + 5'4 - 57'5 - 57'5	The coincidence of the two spectra appeared perfect. Spectrum faint. Star-line fairly well seen at times. Position Circle, 6°.
June 28. 23. 0 23. 15 23. 30 23. 45 29. 0. 0 0. 20 0. 40 0. 50 1. 5 1. 20 1. 35 1. 50	M M M M M M M M M M M M	Arcturus ,, ϵ^2 Boötis ,, α Serpentis ... ,, γ Draconis ... ,, γ Cygni ,, α Cygni ,,	b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁ b ₁	0'124 0'124 0'124 0'124 0'124 0'124 0'124 0'124 0'124 0'124 0'124 0'124	-0'049 -0'074 -0'036 +0'024 +0'033 +0'008 +0'072 +0'044 +0'009 +0'007 -0'046 +0'009	- $\frac{1}{5}$ - $\frac{1}{4}$ - $\frac{1}{10}$ + $\frac{1}{4}$ + $\frac{1}{7}$ + $\frac{1}{20}$ + $\frac{2}{5}$ + $\frac{1}{4}$ + $\frac{1}{10}$ 0 - $\frac{1}{5}$ + $\frac{1}{20}$	+ 14'7 + 14'7 + 12'7 + 12'7 + 11'7 + 11'7 + 0'9 + 0'9 - 6'9 - 6'9 - 7'4 - 7'4	- 33'1 - 42'5 - 26'2 - 3'7 + 0'7 - 8'7 + 26'1 + 15'6 + 10'3 + 9'5 - 9'9 + 10'8	- 36'0 - 41'3 - 23'3 + 2'5 + 3'5 - 6'4 + 41'6 + 25'7 + 17'5 + 6'9 - 13'9 + 12'7	Spectrum very tremulous. Definition poor. Spectrum fairly steady, but definition bad. Star-lines seen with great difficulty. The spectrum of this star is of the second type, and not of the third, as given by Secchi. Spectrum faint. Definition poor. Star-lines seen with great diffi- culty. Spectrum very tremulous. Definition bad. Star-lines seen with great difficulty. Spectrum very tremulous. Definition very bad. Spectrum very tremulous. Definition bad. Star-lines seen with great difficulty. Position Circle, 6°.
June 29. 12. 0 12. 2 12. 4 12. 6 12. 8	M M M M M	Sky ,, ,, ,, ,,	b ₁ b ₁ b ₁ b ₁ b ₁	0'124 0'124 0'124 0'124 0'124	-0'013 +0'010 +0'024 +0'005 -0'018			- 4'9 - 3'8 + 9'0 + 1'9 - 6'8		The coincidence of the two spectra appeared perfect. Position Circle, 6°.
July 5. 22. 30 22. 50 23. 15 23. 30 23. 45 23. 58 6. 0. 15	M M M M M M M	Arcturus ,, α Coronæ Bor. ,, α Ophiuchi ... ,, α Lyrae	F F F F F F F	0'150 0'150 0'150 0'150 0'150 0'150 0'150	-0'132 -0'011 +0'124 +0'111 -0'023 -0'069 -0'081	- $\frac{1}{2}$ - $\frac{1}{10}$ + $\frac{2}{10}$ + $\frac{2}{5}$ - $\frac{1}{10}$ - $\frac{1}{4}$ - $\frac{3}{10}$	+ 15'1 + 15'1 + 11'4 + 11'4 + 5'7 + 5'7 0'0	- 55'2 - 18'4 + 26'3 + 22'3 - 12'7 - 26'7 - 24'6	- 54'8 - 23'0 + 28'3 + 20'3 - 13'6 - 25'5 - 23'8	Spectrum very tremulous, but star-line fairly well seen at times. Spectrum fairly steady. Definition fair. Spectrum steady. Definition fair. Spectrum bright and steady. Definition fair.

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Date, 1886.
Greenwich
Civil Time.

Observer.

Object.

Line.

Width
of
Slit.

Displacement.

Measured. Estimated.

Earth's
Motion in
Miles per
Second.Concluded Motion
of Stars in Miles per
Second.

Measured. Estimated.

REMARKS.

Date, 1886. 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.	
July 6. ^d 6. ^h 0. ^m 30	M	α Lyræ	F	0'150	-0'004	0	0'0	- 1'2	0'0	Position of star very awkward for observing; measures rough in consequence.
0.45	M	α Aquilæ	F	0'150	-0'079	- $\frac{1}{4}$	- 4'3	- 19'7	- 15'5	Spectrum tremulous, but definition fair.
1. 0	M	, ,	F	0'150	-0'105	- $\frac{2}{5}$	- 4'3	- 27'6	- 27'4	Star-line faint.
1.20	M	α Cygni	F	0'150	-0'061	- $\frac{1}{4}$	- 6'8	- 11'7	- 13'0	Spectrum bright and steady. Definition fair.
1.40	M	, ,	F	0'150	-0'129	- $\frac{1}{2}$	- 6'8	- 32'4	- 32'9	Position of star very awkward for observing; measures rough in consequence.
										Position Circle, 6°.
July 6. 13. 15	M	Sky	F	0'150	+0'007			+ 2'1		The coincidence of the two spectra appeared perfect.
13. 17	M	, ,	F	0'150	-0'006			- 1'8		
13. 20	M	, ,	F	0'150	+0'031			+ 9'4		
13. 22	M	, ,	F	0'150	+0'005			+ 1'5		
13. 25	M	, ,	F	0'150	-0'008			- 2'4		
										Position Circle, 6°.
Aug. 10. 22. 30	N	α Lyræ	F	0'114	-0'080	- $\frac{1}{3}$	+ 4'8	- 29'1	- 31'3	Spectrum very bright and steady. Star-line distinct. The coincidence of the two spectra appeared perfect.
22. 35	N	, ,	F	0'114	-0'084	- $\frac{1}{3}$	+ 4'8	- 30'3	- 31'3	
23. 0	N	Moon.....	F	0'114	-0'012			- 3'6		
23. 2	N	, ,	F	0'114	-0'011			- 3'3		
23. 5	N	, ,	F	0'114	-0'007			- 2'1		
23. 8	N	, ,	F	0'114	-0'007			- 2'1		Star-line broad and diffused.
23. 10	N	, ,	F	0'114	+0'005			+ 1'5		
23. 53	N	α Aquilæ	F	0'114	-0'052	- $\frac{1}{5}$	+ 4'9	- 20'7	- 20'8	
23. 58	N	, ,	F	0'114	-0'121	- $\frac{2}{3}$	+ 4'9	- 41'6	- 44'7	
11. 1. 25	N	α Pegasi	F	0'114	-0'028	- $\frac{1}{10}$	+ 9'3	+ 0'8	+ 1'4	
1. 30	N	, ,	F	0'114	-0'011	0	- 9'3	+ 6'0	+ 9'3	Spectrum faint.
										Position Circle, 6°.
Oct. 13. 19. 40	M	α Lyræ	F	0'105	-0'210	- $\frac{3}{4}$	+ 8'7	- 72'5	- 56'5	Clouds constantly passing. Observations much interrupted, but star-line seen fairly well at time of bisection.
19. 55	M	, ,	F	0'105	-0'133	- $\frac{1}{2}$	+ 8'7	- 49'1	- 40'6	
										Position Circle 6°.
Oct. 18. 21. 20	M	α Aquilæ	F	0'105	-0'167	- $\frac{3}{5}$	+ 16'1	- 66'8	- 54'4	Spectrum very faint and tremulous.
21. 40	M	, ,	F	0'105	-0'172	- $\frac{3}{5}$	+ 16'1	- 68'4	- 54'4	
22. 0	M	α Cygni	F	0'105	-0'221	- $\frac{2}{5}$	+ 7'3	- 74'4	- 58'3	Spectrum faint but steady. Star-line fairly well seen.
22. 10	M	, ,	F	0'105	-0'095	- $\frac{2}{5}$	+ 7'3	- 36'1	- 32'8	
										Position Circle, 6°.
Oct. 22. 19. 25	M	α Lyræ	F	0'103	-0'212	- $\frac{4}{5}$	+ 8'5	- 72'9	- 53'2	Spectrum bright and fairly steady.
19. 40	M	, ,	F	0'103	-0'118	- $\frac{1}{5}$	+ 8'5	- 44'3	- 36'5	
20. 5	M	α Aquilæ	F	0'103	-0'088	- $\frac{2}{5}$	+ 16'2	- 42'9	- 38'5	Spectrum bright and fairly steady.
										Position Circle, 6°.
Nov. 5. 22. 35	M	α Andromedæ	F	0'148	+0'035	+ $\frac{1}{5}$	+ 8'6	(+ 2'0)	(+ 9'1)	The lines in the spectrum of the Moon seemed to be displaced towards the red.
22. 55	M	, ,	F	0'148	+0'009	+ $\frac{1}{20}$	+ 8'6	(- 5'9)	(- 4'1)	
23. 10	M	Moon.....	F	0'148	+0'034			(+ 10'3)		
23. 15	M	, ,	F	0'148	+0'046			(+ 14'0)		
23. 20	M	, ,	F	0'148	+0'013			(+ 4'0)		
23. 22	M	, ,	F	0'148	+0'012			(+ 3'6)		
23. 25	M	, ,	F	0'148	-0'014			(- 4'3)		
23. 45	M	Rigel.....	F	0'148	+0'169	+ $\frac{3}{5}$	- 8'4	(+ 59'7)	(+ 61'6)	
6. 0. 5	M	, ,	F	0'148	+0'161	+ $\frac{3}{5}$	- 8'4	(+ 57'3)	(+ 61'6)	
0. 30	M	Sirius	F	0'148	+0'054	+ $\frac{1}{5}$	- 12'3	(+ 28'7)	(+ 30'0)	

Date, 1886. 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.	
Nov. 6. ^d 0. ^h 40 ^m	M	Sirius.....	F	0.148	+0.050	+ $\frac{1}{8}$	- 12.3	(+ 27.5)	(+ 30.0)	<i>Note.</i> —On examining the spectroscope on the following morning, it was found to be out of adjustment. The observations have therefore not been used. Position Circle, 6°.
0. 50	M	,,	F	0.148	+0.073	+ $\frac{1}{4}$	- 12.3	(+ 34.5)	(+ 34.5)	
1. 0	M	,,	F	0.148	+0.069	+ $\frac{1}{4}$	- 12.3	(+ 33.3)	(+ 34.5)	
Nov. 17. 23. 15	M	Aldebaran ...	F	0.119	+0.132	+ $\frac{3}{8}$	- 4.1	+ 44.2	+ 41.2	Spectrum steady, but star-line rather faint.
23. 25	M	,,	F	0.119	+0.132	+ $\frac{3}{8}$	- 4.1	+ 44.2	+ 41.2	
23. 40	M	,,	F	0.119	+0.154	+ $\frac{3}{8}$	- 4.1	+ 50.9	+ 45.8	
23. 50	M	,,	F	0.119	+0.111	+ $\frac{1}{2}$	- 4.1	+ 37.8	+ 31.9	Spectrum tremulous, but star-line distinct and well defined.
18. 0. 5	M	Rigel.....	F	0.119	+0.019	+ $\frac{1}{10}$	- 5.4	+ 11.2	+ 11.0	
0. 15	M	,,	F	0.119	+0.010	+ $\frac{1}{20}$	- 5.4	+ 8.4	+ 8.2	
0. 25	M	γ Orionis	F	0.119	+0.118	+ $\frac{3}{8}$	- 7.2	+ 43.0	+ 40.6	Spectrum fairly bright and steady. The star-line appeared to be broader and more diffused than usual.
0. 30	M	,,	F	0.119	-0.068	- $\frac{1}{8}$	- 7.2	- 13.5	- 11.3	
0. 35	M	,,	F	0.119	+0.009	- $\frac{1}{20}$	- 7.2	+ 9.9	+ 10.0	
0. 40	M	,,	F	0.119	-0.002	0	- 7.2	+ 6.6	+ 7.2	Spectrum steady. Star-line well seen.
0. 50	M	β Tauri.....	F	0.119	-0.073	- $\frac{1}{8}$	- 8.0	- 14.2	- 18.5	
1. 0	M	,,	F	0.119	-0.032	- $\frac{1}{10}$	- 8.0	- 1.7	+ 2.4	
1. 10	M	Sirius	F	0.119	-0.032	- $\frac{1}{8}$	- 10.6	+ 0.9	- 0.5	Spectrum very bright but tremulous. Star-line well seen. Direct comparison showed that the two spectra were almost in exact coincidence, the displacement, if any, being towards the red.
1. 15	M	,,	F	0.119	+0.002	0	- 10.6	+ 11.2	+ 10.6	
1. 20	M	,,	F	0.119	+0.016	+ $\frac{1}{10}$	- 10.6	+ 15.5	+ 16.2	
1. 25	M	,,	F	0.119	+0.010	+ $\frac{1}{20}$	- 10.6	+ 13.6	+ 13.4	Spectrum steady. Star-line well seen. Direct comparison showed that the two spectra were almost in exact coincidence, but with a very slight displacement towards the blue.
1. 30	M	,,	F	0.119	-0.008	0	- 10.6	+ 8.2	+ 10.6	
1. 35	M	,,	F	0.119	-0.032	- $\frac{1}{8}$	- 10.6	+ 0.9	- 0.5	
1. 40	M	Procyon	F	0.119	-0.032	- $\frac{1}{8}$	- 15.4	+ 5.7	+ 6.1	Spectrum steady and fairly bright. Star-line diffused, but seen well.
1. 45	M	,,	F	0.119	-0.062	- $\frac{1}{8}$	- 15.4	- 3.4	- 3.1	
1. 50	M	,,	F	0.119	+0.034	+ $\frac{1}{8}$	- 15.4	+ 25.7	+ 26.5	
1. 55	M	,,	F	0.119	-0.018	- $\frac{1}{10}$	- 15.4	+ 9.9	+ 9.8	Spectrum steady and fairly bright. Star-line diffused, but seen well.
2. 5	M	Castor	F	0.119	+0.011	+ $\frac{1}{10}$	- 14.7	+ 18.0	+ 17.5	
2. 10	M	,,	F	0.119	+0.075	+ $\frac{3}{8}$	- 14.7	+ 37.5	+ 36.9	
2. 20	M	Pollux	F	0.119	-0.086	- $\frac{3}{8}$	- 15.5	- 10.6	- 12.3	Spectrum steady. Star-line very faint, but seen fairly well at times.
2. 30	M	,,	F	0.119	-0.118	- $\frac{3}{8}$	- 15.5	- 20.3	- 12.3	
2. 40	M	Moon.....	F	0.119	-0.003	0	- 15.5	- 0.9	- 0.9	
2. 45	M	,,	F	0.119	0.000	0	- 15.5	0.0	0.0	The coincidence of the two spectra appeared perfect. Moon spectrum very well defined.
2. 50	M	,,	F	0.119	-0.001	0	- 15.5	- 0.3	- 0.3	
2. 55	M	,,	F	0.119	-0.001	0	- 15.5	- 0.3	- 0.3	
3. 0	M	,,	F	0.119	+0.010	0	- 15.5	+ 3.0	+ 3.0	Position Circle, 6°.
Nov. 29. 19. 30	M	β Persei	F	0.173	+0.095	+ $\frac{3}{8}$	+ 3.9	+ 24.9	+ 15.3	Spectrum bright and steady. Star-line very broad and diffused, but seen well. The displacement was evidently very small.
19. 36	M	,,	F	0.173	+0.094	+ $\frac{3}{8}$	+ 3.9	+ 24.7	+ 15.3	
19. 39	M	,,	F	0.173	-0.039	- $\frac{1}{10}$	+ 3.9	- 15.7	- 8.7	
19. 44	M	,,	F	0.173	-0.017	- $\frac{1}{10}$	+ 3.9	- 9.0	- 8.7	Spectrum steady, but star-line very difficult to observe. Same type as Procyon.
19. 48	M	,,	F	0.173	-0.015	- $\frac{1}{10}$	+ 3.9	- 8.5	- 6.3	
19. 53	M	,,	F	0.173	-0.043	- $\frac{1}{8}$	+ 3.9	+ 9.2	+ 5.7	
20. 30	M	α Persei	F	0.173	-0.031	- $\frac{1}{10}$	+ 2.0	- 11.4	- 6.8	Spectrum tremulous. Definition poor. Observations made with much difficulty.
20. 50	M	,,	F	0.173	+0.089	+ $\frac{1}{2}$	+ 2.0	+ 25.0	+ 22.0	
21. 20	M	Aldebaran.....	F	0.173	+0.042	+ $\frac{1}{4}$	- 0.2	+ 12.9	+ 12.2	
21. 40	M	,,	F	0.173	+0.081	+ $\frac{3}{8}$	- 0.2	+ 24.8	+ 24.2	Definition poor. Star-line seen with much difficulty. Observations rough.
22. 0	M	Capella	F	0.173	+0.096	+ $\frac{3}{8}$	- 3.8	+ 32.9	+ 32.6	
22. 15	M	,,	F	0.173	+0.073	+ $\frac{1}{2}$	- 3.8	+ 26.0	+ 27.8	
Nov. 30. 11. 30	M	Sky	F	0.173	+0.015	0	- 4.6	- 4.6	- 4.6	No want of coincidence between the two spectra was detected.
11. 34	M	,,	F	0.173	-0.029	0	- 8.8	- 8.8	- 8.8	
11. 37	M	,,	F	0.173	-0.006	0	- 1.8	- 1.8	- 1.8	
11. 41	M	,,	F	0.173	+0.028	0	+ 8.5	+ 8.5	+ 8.5	Position Circle, 6°.
11. 45	M	,,	F	0.173	-0.011	0	- 3.3	- 3.3	- 3.3	

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Date, 1886. 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.	
Dec. 4. 20. 40	M	β Arietis	F	0'206	+0'130	+ $\frac{1}{2}$	+ 12'1	+ 27'4	+ 28'3	Spectrum rather faint but steady. Definition good.
20. 50	M	,,	F	0'206	+0'059	+ $\frac{1}{4}$	+ 12'1	+ 5'8	+ 8'1	
21. 5	M	,,	F	0'206	+0'042	+ $\frac{1}{10}$	+ 12'1	+ 0'6	- 4'0	
21. 15	M	,,	F	0'206	+0'092	+ $\frac{1}{3}$	+ 12'1	+ 15'9	+ 14'8	Spectrum bright and steady. Definition fair. The coincidence of the two spectra appeared perfect.
21. 25	M	Moon.....	F	0'206	+0'017			+ 5'1		
21. 29	M	,,	F	0'206	-0'041			- 12'4		
21. 32	M	,,	F	0'206	+0'027			+ 8'2		
21. 36	M	,,	F	0'206	+0'024			+ 7'3		
21. 40	M	,,	F	0'206	-0'012			- 3'6		Spectrum rather faint but steady. Star-line not seen very well, but unmistakably greatly displaced towards the blue.
22. 5	M	β Persei	F	0'206	-0'358	- $1\frac{1}{4}$	+ 5'4	- 114'1	- 106'4	
22. 15	M	,,	F	0'206	-0'362	- $1\frac{1}{4}$	+ 5'4	- 115'3	- 106'4	
22. 25	M	,,	F	0'206	-0'395	- $1\frac{1}{2}$	+ 5'4	- 125'4	- 126'6	
22. 35	M	,,	F	0'206	-0'286	- 1	+ 5'4	- 92'3	- 86'2	
22. 50	M	α Persei	F	0'206	+0'001	0	+ 3'5	- 3'2	- 3'5	Spectrum steady. Definition good. Displacement evidently very small.
23. 0	M	,,	F	0'206	-0'046	- $\frac{1}{10}$	+ 3'5	- 17'5	- 11'6	
23. 15	M	Aldebaran.....	F	0'206	+0'116	+ $\frac{1}{2}$	+ 1'5	+ 33'8	+ 38'9	Spectrum bright and steady, but star-line not seen well. Position Circle, 6°.
23. 25	M	,,	F	0'206	+0'167	+ $\frac{3}{5}$	+ 1'5	+ 49'2	+ 47'0	
Dec. 14. 19. 55	M	β Persei	F	0'200	+0'146	+ $\frac{1}{2}$	+ 8'3	+ 36'0	+ 29'5	Spectrum fairly bright and steady. Definition fair. Position Circle, 6°.
19. 57	M	,,	F	0'200	+0'005	0	+ 8'3	- 6'8	- 8'3	
20. 0	M	,,	F	0'200	+0'112	+ $\frac{1}{2}$	+ 8'3	+ 25'7	+ 29'5	
20. 4	M	,,	F	0'200	-0'029	- $\frac{1}{20}$	+ 8'3	- 17'1	- 12'1	
20. 17	L	,,	F	0'200	+0'005	+ $\frac{1}{10}$	+ 8'3	- 6'8	- 0'7	
20. 19	L	,,	F	0'200	+0'008	+ $\frac{1}{3}$	+ 8'3	- 5'9	+ 29'5	
20. 24	L	,,	F	0'200	+0'030	+ $\frac{1}{2}$	+ 8'3	+ 0'8	+ 29'5	
20. 26	L	,,	F	0'200	-0'030	0	+ 8'3	- 17'4	- 8'3	
20. 28	L	,,	F	0'200	+0'067	+ $\frac{1}{4}$	+ 8'3	+ 12'1	+ 10'6	
20. 33	M	,,	F	0'200	+0'103	+ $\frac{1}{2}$	+ 8'3	+ 23'0	+ 29'5	

ROTATION of JUPITER deduced from the Relative Displacement of Lines in the Spectrum at the Preceding and Following Limbs respectively.

Date, 1886. Greenwich Civil Time.	Observer.	<i>p</i> Limb.	<i>f</i> Limb.	Line.	Width of Slit.	Displacement Measured. <i>p</i> - <i>f</i>	Concluded Motion in Miles per Second. <i>p</i> - <i>f</i>	Position Circle.	REMARKS.
d. h. m. May 15. 22. 40	M	r. 1'010	r. 0'933	F	r. 0'103	+ 0'077	+ 23'4	32°	Cylindrical lens before slit. Slit tangential to limb. The limb of the planet was brought up as carefully as possible to the outer edge of the slit, which was about 1"0 in width. The mean point observed was therefore about 0"5 from the limb. Spectrum faint, and measures very difficult though the definition was fair.
22. 50	M	1'052	0'898	F	0'103	+ 0'154	+ 46'8	32	
23. 0	M	1'076	0'994	F	0'103	+ 0'082	+ 24'9	32	
23. 15	M	1'024	0'962	F	0'103	+ 0'062	+ 18'8	32	
23. 25	M	1'099	0'942	F	0'103	+ 0'157	+ 47'7	32	
						Mean...	+ 32'3		

Calculated Relative Motion of the limbs (*p*-*f*) + 32 miles per second.

EXPERIMENTAL OBSERVATIONS of DISPLACEMENT of LINES in the SPECTRA of STARS, as compared with those of TERRESTRIAL ELEMENTS, made with the REVERSION APPARATUS of the OXFORD REVERSION SPECTROSCOPE, at the ROYAL OBSERVATORY, GREENWICH, in the Year 1886.

The following observations were made with the reversion apparatus and viewing telescope of the Reversion Spectroscope belonging to the University Observatory, Oxford, which had been lent by the Rev. Prof. Pritchard for the purpose of experiment. The slit, collimator, and prisms of the Greenwich Half-prism Spectroscope were used, the Oxford Reversion Spectroscope not being well adapted in its complete state for use with the S. E. Equatoreal, but the viewing telescope of the Half-prism Spectroscope was taken off, and the reversion prisms and viewing telescope of the Oxford Spectroscope substituted for it. As the aperture of the telescope of the Oxford instrument was very much smaller than that of the Half-prism Spectroscope, a considerable portion of the light was lost in this rough combination. It was not found possible to attach the two instruments very rigidly to each other without making serious alterations in one or the other. The observations were therefore made under great disadvantages, and direct micrometric measures were found to be out of the question. The following estimations were however made successfully. One half-prism was used throughout.

Date, 1886. Greenwich Civil Time.	Observer.	Object.	Line.	Width of Slit.	Estimated Displace- ment.	Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.	REMARKS.
Feb. 26. ^h 20. ^m 5	M	Sirius	F	0'135	- $\frac{1}{4}$	+ 11'9	- 24'1	Spectrum very tremulous, and definition poor. Neither the micrometer screw moving the prisms of the Half-prism spectroscope, nor that moving the prisms of the reversion apparatus moved with sufficient steadiness for any trustworthy measures to be obtained by their means. It was only possible therefore to make estimations. These were made by bringing the two images of the dark F line in the star spectrum into coincidence, and then immediately flashing in the bright hydrogen line, and estimating the distance between the centres of the two images of the bright hydrogen line in terms of its breadth. In the first nine observations the micrometer screw moving the prisms of the Half-prism spectroscope was turned in order to bring the lines into coincidence; in the last four, the micrometer screw of the reversion apparatus; the latter proved much the more sensitive and satisfactory; indeed when the finger was lifted from the first-mentioned micrometer the spectra would often shift while actually under observation. Notwithstanding the comparative faintness of the spectrum, its tremulousness and poor definition, it was found fairly easy to bring the two spectra into coincidence, but it was not so easy as had been anticipated.
20. 10	M	"	F	0'135	- $1\frac{1}{2}$	+ 11'9	- 76'9	
20. 15	M	"	F	0'135	- $\frac{3}{3}$	+ 11'9	- 44'4	
20. 20	M	"	F	0'135	- 1	+ 11'9	- 60'7	
20. 25	M	"	F	0'135	- $\frac{1}{4}$	+ 11'9	- 24'1	
22. 30	M	"	F	0'135	- $1\frac{1}{4}$	+ 11'9	- 72'8	
20. 35	M	"	F	0'135	- $1\frac{1}{4}$	+ 11'9	- 72'8	
20. 40	M	"	F	0'135	- $1\frac{1}{4}$	+ 11'9	- 72'8	
20. 45	M	"	F	0'135	- $1\frac{1}{2}$	+ 11'9	- 85'1	
20. 50	M	"	F	0'135	- 1	+ 11'9	- 60'7	
20. 55	M	"	F	0'135	- $\frac{1}{4}$	+ 11'9	- 24'1	
21. 0	M	"	F	0'135	- 1	+ 11'9	- 60'7	
21. 5	M	"	F	0'135	- $\frac{1}{4}$	+ 11'9	- 24'1	
					Mean		- 57'2	
21. 15	M	Procyon	F	0'135	0	+ 12'5	- 12'5	Spectrum faint. Definition poor. The observations of this star were however much more satisfactory than those of Sirius, and repeated observations showed that the displacement was practically nil. The precision with which the two images of the line could be brought into coincidence was evidently much greater than that with which the star line can be bisected by the pointer in the ordinary observations with the Half-prism spectroscope.
21. 20	M	"	F	0'135	- $\frac{1}{100}$	+ 12'5	- 17'4	
21. 25	M	"	F	0'135	- $\frac{1}{100}$	+ 12'5	- 13'0	
21. 30	M	"	F	0'135	- $\frac{1}{100}$	+ 12'5	- 13'0	
21. 35	M	"	F	0'135	0	+ 12'5	- 12'5	
					Mean		- 13'7	
21. 45	M	Castor	F	0'135	+ $\frac{1}{100}$	+ 14'1	- 13'6	The spectrum was exceedingly faint, but the observations were made with comparative ease, the extreme faintness of the spectrum being the only drawback.
21. 50	M	"	F	0'135	+ $\frac{1}{100}$	+ 14'1	- 13'6	
21. 55	M	"	F	0'135	+ $\frac{1}{10}$	+ 14'1	- 9'2	
22. 0	M	"	F	0'135	+ $\frac{1}{3}$	+ 14'1	+ 2'1	
22. 5	M	"	F	0'135	+ $\frac{1}{3}$	+ 14'1	+ 2'1	
					Mean		- 6'4	
								The adjustment of this rough combination of the two spectroscopes was defective in one particular, which may have affected the measures systematically. Although the lines in the two spectra were truly parallel to each other, the two spectra themselves were not parallel; the inverted,—not the reversed,—spectrum, which was the lower in the field of view, sloping downwards towards the right hand, that is towards its own red end. Position Circle, 6°.

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

COLLECTED RESULTS for MOTIONS of STARS in the line of Sight, from SPECTROSCOPIC OBSERVATIONS
made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1886.

(F for the Star or Moon is compared with $H\beta$ of Hydrogen ; and b_1, b_2, b_4 , with Mg_1, Mg_2, Mg_3 , of Magnesium.)

(+ denotes Recession ; - Approach.)

Date, 1886.	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.									
January 27	M	2	1	186	0.154	F	+ 15.4	- 26.4	- 23.6
February 1	M	2	1	6	0.104	F	+ 14.7	- 75.3	- 44.2
November 5	M	2	1	6	0.148	F	+ 8.6	(- 2.0)	(+ 2.5)
γ PEGASI.									
F line broad and diffused at the edges.									
February 1	M	2	1	6	0.104	F	+ 15.0	- 6.5	- 5.7
β ARIETIS.									
F line broad, estimated breadth 18 tenth-metres, but dark and less diffused at the edges than in many stars of the type.									
February 1	M	2	1	6	0.104	F	+ 18.4	- 85.4	- 45.5
December 4	M	4	1	6	0.206	F	+ 12.1	+ 12.4	+ 11.8
β PERSEI.									
F line broad, estimated breadth 21 tenth-metres. The character of the line appears to change ; it is generally nebulous without any central condensation, but has occasionally been observed as dark and sharply defined.									
January 27	M	2	1	186	0.154	F	+ 16.8	- 50.2	- 46.4
February 1	M	2	1	6	0.104	F	+ 17.1	- 28.6	- 30.7
November 29	M	6	1	6	0.173	F	+ 3.9	+ 4.3	+ 2.1
December 4	M	4	1	6	0.206	F	+ 5.4	- 111.8	- 106.4
14	M	5	1	6	0.200	F	+ 8.3	+ 12.2	+ 13.6
14	L	5	1	6	0.200	F	+ 8.3	- 3.4	+ 12.1

Date, 1886.	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.	
<i>α</i> PERSEI.										
The F line in this spectrum resembles that of Procyon, viz., a narrow but rather faint line on a broad nebulous band. The latter is nearly 24 tenth-metres in breadth.										
January 27	M	2	1	186	0.154	F	+ 15.1	- 40.9	- 34.8	
February 1	M	2	1	6	0.104	F	+ 15.6	- 21.2	- 25.7	
November 29	M	2	1	6	0.173	F	+ 2.0	+ 6.8	+ 7.6	
December 4	M	2	1	6	0.206	F	+ 3.5	- 10.4	- 7.6	
<i>α</i> TAURI (<i>Aldebaran</i>).										
F line narrow, sharp, and fairly dark ; <i>b</i> lines narrow, sharp, and distinct.										
January 27	M	2	1	186	0.154	F	+ 16.3	+ 22.9	+ 8.3	
March 3	M	2	1	6	0.190	F	+ 18.5	+ 24.8	+ 13.4	
17	M	2	1	6	0.153	<i>b</i> ₁	+ 17.4	+ 13.6	+ 24.9	
November 17	M	4	1	6	0.119	F	- 4.1	+ 44.3	+ 40.0	
29	M	2	1	6	0.173	F	- 0.2	+ 18.9	+ 18.2	
December 4	M	2	1	6	0.206	F	+ 1.5	+ 41.5	+ 43.0	
<i>α</i> AURIGÆ (<i>Capella</i>).										
F line narrow and sharp, but not very dark ; <i>b</i> lines narrow, sharp, and fairly dark.										
January 27	M	4	1	186	0.154	F	+ 12.9	- 4.0	- 3.9	
March 3	M	2	1	6	0.190	F	+ 17.1	- 54.5	- 52.5	
17	M	2	1	6	0.153	<i>b</i> ₁	+ 16.9	+ 42.3	+ 46.6	
23	N	2	1	186	0.190	<i>b</i> ₁	+ 16.6	- 20.8	- 16.6	
April 6	N	2	1	6	0.218	F	+ 15.1	+ 1.5	- 0.4	
November 29	M	2	1	6	0.173	F	- 3.8	+ 29.5	+ 30.2	
<i>β</i> ORIONIS (<i>Rigel</i>).										
F line narrow, sharp, and fairly dark ; estimated breadth 0.9 tenth-metre.										
January 27	M	2	1	186	0.154	F	+ 12.9	+ 30.6	+ 17.8	
February 1	M	2	1	6	0.104	F	+ 13.7	+ 5.5	+ 0.3	
March 3	M	2	1	6	0.190	F	+ 16.0	+ 19.4	+ 8.8	
November 5	M	2	1	6	0.148	F	- 8.4	(+ 58.5)	(+ 61.6)	
18	M	2	1	6	0.119	F	- 5.4	+ 9.8	+ 9.6	

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

Date, 1886.	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 ORIONIS.										
F line narrow, but a little diffused at the edges. Estimated total breadth 4 tenth-metres, central condensation 1.3 tenth-metres.										
January 27	M	2	1	186	0.154	F	+ 13.6	+ 4.9	— 2.7	
February 1	M	2	1	6	0.104	F	+ 14.6	— 1.3	— 4.0	
March 3	M	2	1	6	0.190	F	+ 17.8	+ 6.3	+ 0.6	
November 18	M	4	1	6	0.119	F	— 7.2	+ 11.5	+ 11.6	
β TAURI.										
F line broad, diffused, and fairly dark. Breadth 16 tenth-metres, central condensation 4.0 tenth-metres.										
January 27	M	2	1	186	0.154	F	+ 13.8	— 38.0	— 37.9	
February 1	M	2	1	6	0.104	F	+ 14.8	— 25.4	— 25.3	
March 3	M	4	1	6	0.190	F	+ 18.4	— 31.5	— 35.1	
November 18	M	2	1	6	0.119	F	— 8.0	— 8.0	— 8.1	
δ ORIONIS.										
F line faint and ill-defined, but not very broad.										
January 27	M	2	1	186	0.154	F	+ 12.7	+ 7.8	+ 3.8	
ϵ ORIONIS.										
F line faint and ill-defined, but not very broad.										
January 27	M	2	1	186	0.154	F	+ 12.4	+ 14.8	+ 7.3	
ζ ORIONIS.										
F line faint and ill-defined, but not very broad.										
January 27	M	2	1	186	0.154	F	+ 12.1	+ 13.2	+ 14.2	

Date, 1886.	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.	
κ ORIONIS.										
F line dark and distinct.										
January 27	M	2	1	186	0.154	F	+ 10.9	- 21.4	- 19.1	
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.										
March 17	M	2	1	6	0.153	<i>b</i> ₄	+ 17.8	+ 34.0	+ 39.4	
β AURIGÆ.										
F line broad and nebulous.										
January 27	M	2	1	186	0.154	F	+ 11.3	- 35.5	- 40.9	
March 3	M	2	1	6	0.190	F	+ 16.8	- 58.7	- 55.1	
γ GEMINORUM.										
F line dark but very broad, and very diffused at the edges.										
January 27	M	6	1	186	0.154	F	+ 9.5	- 48.1	- 40.7	
February	M	2	1	6	0.104	F	+ 10.9	- 43.7	- 34.2	
α CANIS MAJORIS (<i>Sirius</i>).										
F line dark, but very broad and diffused at the edges. Estimated breadth 21 tenth-metres, central condensation 6 tenth-metres.										
January 19	M	2	1	186	0.150	F	+ 4.4	- 13.7	- 13.1	
27	M	6	1	186	0.154	F	+ 6.3	- 32.6	- 32.2	
* February 26	M	13	1	6	0.135	F	+ 11.9	...	- 57.2	
March 3	M	6	1	6	0.190	F	+ 12.6	- 38.6	- 35.7	
November 6	M	4	1	6	0.148	F	- 12.3	(+ 31.0)	(+ 32.3)	
18	M	6	1	6	0.119	F	- 10.6	+ 8.4	+ 8.3	
* Observations made with the reversion apparatus of the Oxford Reversion Spectroscope.										

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

Date, 1886.	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 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 21 tenth-metres ; no central condensation.										
January 27	M	2	1	186	0.154	F	+ 6.2	+ 29.1	+ 32.1	
*February 26	M	5	1	6	0.135	F	+ 14.1	...	- 6.4	
April 6	N	4	1	6	0.218	F	+ 18.0	- 14.9	- 15.8	
May 1	M	2	1	6	0.065	F	+ 16.4	+ 24.7	+ 13.0	
November 18	M	2	1	6	0.119	F	- 14.7	+ 27.8	+ 27.2	
* Observations made with the reversion apparatus of the Oxford Reversion Spectroscope.										
α CANIS MINORIS (<i>Procyon</i>). F line narrow but rather faint and surrounded by a broad nebulous haze. Estimated breadth of haze 16 tenth-metres.										
January 18	N	3	1	186	0.150	F	+ 1.5	+ 0.3	- 1.5	
27	M	6	1	186	0.154	F	+ 4.4	- 13.8	- 13.5	
28	N	1	1	186	0.154	F	+ 4.7	- 4.1	- 4.7	
*February 26	M	5	1	6	0.135	F	+ 12.5	...	- 13.7	
March 3	M	4	1	6	0.190	F	+ 13.6	- 38.8	- 41.3	
April 6	N	2	1	6	0.218	F	+ 17.5	- 21.5	- 21.9	
May 1	M	2	1	6	0.065	F	+ 16.6	- 57.9	- 41.3	
November 18	M	4	1	6	0.119	F	- 15.4	+ 9.5	+ 9.8	
* Observations made with the reversion apparatus of the Oxford Reversion Spectroscope.										
β GEMINORUM (<i>Pollux</i>). F line narrow but faint. <i>b</i> lines narrow and sharp but faint.										
January 27	M	2	1	186	0.154	F	+ 5.3	- 45.1	- 51.8	
March 17	M	2	1	6	0.153	<i>b</i> ₁	+ 16.8	- 29.4	- 39.0	
23	N	2	1	186	0.190	<i>b</i> ₁	+ 17.4	- 24.3	- 23.8	
April 6	N	2	1	6	0.218	F	+ 18.1	- 30.5	- 29.9	
May 1	M	2	1	6	0.065	F	+ 16.9	- 45.8	- 45.1	
November 18	M	2	1	6	0.119	F	- 15.5	- 15.5	- 12.3	

Date, 1886.	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 LEONIS (<i>Regulus</i>).										
F line faint, very ill-defined, and nebulous. A specially difficult object for measurement.										
April	30	N	2	1	6	0.175	F	+ 17.2	— 17.2	— 17.2
May	3	M	2	1	6	0.135	F	+ 17.5	+ 1.8	+ 4.7
	6	N	2	1	6	0.145	F	+ 17.6	— 14.3	— 13.4
	15	M	2	1	6	0.103	F	+ 17.9	— 5.2	— 3.4
	18	N	2	1	6	0.180	F	+ 17.9	— 3.0	— 2.9
β URSÆ MAJORIS.										
F line dark, broad, and nebulous.										
May	1	M	2	1	6	0.065	F	+ 12.7	+ 5.7	— 2.0
α URSÆ MAJORIS.										
F line exceedingly faint. <i>b</i> lines fairly well defined.										
May	1	M	2	1	6	0.140	F	+ 11.7	— 59.7	— 52.7
June	16	N	2	1	6	0.150	<i>b</i> ₁	+ 8.7	— 57.3	— 57.5
δ LEONIS.										
F line very broad and dark, and somewhat ill-defined at the edges. Estimated breadth 29 tenth-metres; central condensation, 8 tenth-metres.										
May	15	M	2	1	6	0.103	F	+ 16.8	— 44.0	— 50.1
β LEONIS.										
F line very broad and diffused at the edges. Estimated breadth 26 tenth-metres; central condensation, 5 tenth-metres.										
April	30	N	2	1	6	0.175	F	+ 13.6	— 30.5	— 30.3
May	4	M	2	1	6	0.135	F	+ 14.2	— 10.9	— 10.5
	15	M	2	1	6	0.103	F	+ 15.9	— 14.7	— 13.8

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

Date, 1886.	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 URSÆ MAJORIS.										
F line very broad and nebulous.										
May	1	M	2	1	6	0.140	F	+ 11.7	+ 1.2	+ 0.8
June	16	N	2	1	6	0.150	b ₁	+ 10.9	— 2.9	— 2.8
γ VIRGINIS.										
The two components of this double star have been observed together as one star.										
F line faint, broad, and diffused at the edges.										
May	4	M	2	1	6	0.135	F	+ 10.4	— 43.6	— 41.1
ϵ URSÆ MAJORIS.										
F line very broad and nebulous.										
May	1	M	2	1	6	0.140	F	+ 9.5	— 5.1	— 3.0
α CANUM VENATICORUM.										
F line very dark, broad, and well defined.										
May	13	M	2	1	6	0.153	F	+ 11.9	— 35.6	— 36.8
α VIRGINIS (<i>Spica</i>).										
F line faint and ill-defined.										
April	30	N	2	1	6	0.175	F	+ 5.7	— 16.5	— 15.7
May	4	M	2	1	6	0.135	F	+ 6.6	— 60.8	— 53.4
	18	M	2	1	6	0.180	F	+ 10.5	— 7.4	— 6.4
ζ URSÆ MAJORIS.										
F line dark, broad, and nebulous.										
May	2	M	2	1	6	0.140	F	+ 8.4	+ 6.5	+ 7.0

Date, 1886.	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 BOOTIS (<i>Arcturus</i>).										
F line narrow and sharp. <i>b</i> lines dark, narrow, and sharp.										
April	30	N	2	1	6	0.175	F	+ 4.8	- 21.0	- 21.5
May	4	M	2	1	6	0.135	F	+ 5.5	- 71.3	- 64.6
	6	N	2	1	6	0.145	F	+ 6.2	- 23.7	- 23.9
	13	M	2	1	6	0.153	F	+ 7.8	- 35.0	- 39.4
	18	N	2	1	6	0.180	F	+ 8.9	- 35.0	- 33.5
	20	N	2	1	6	0.230	F	+ 9.3	- 26.5	- 27.8
June	7	M	2	1	6	0.165	<i>b</i> ₁	+ 12.5	- 49.1	- 46.9
	15	N	2	1	6	0.150	<i>b</i> ₁	+ 13.5	- 57.3	- 54.2
	28	M	2	1	6	0.124	<i>b</i> ₁	+ 14.7	- 37.8	- 38.7
July	5	M	2	1	6	0.150	F	+ 15.1	- 36.8	- 38.9
ϵ^2 BOOTIS.										
F line faint and narrow.										
June	28	M	2	1	6	0.124	F	+ 12.7	- 15.0	- 10.4
β LIBRÆ.										
F line faint and narrow.										
May	13	M	2	1	6	0.153	F	+ 1.7	- 24.8	- 23.3
α CORONÆ BOREALIS.										
F line dark, very broad, and diffused at the edges. Estimated breadth 31 tenth-metres; central portion of the line 8 tenth-metres. There is no very marked condensation at the centre of the line.										
May	4	M	4	1	6	0.135	F	+ 0.7	- 26.6	- 23.8
	14	M	2	1	6	0.153	F	+ 2.8	+ 12.8	+ 19.6
	20	N	2	1	6	0.230	F	+ 4.2	- 16.2	- 15.0
July	5	M	2	1	6	0.150	F	+ 11.4	+ 24.3	+ 24.3
α SERPENTIS.										
<i>b</i> lines very faint and difficult to see.										
June	29	M	2	1	6	0.124	<i>b</i> ₁	+ 11.7	- 4.0	- 1.5

GREENWICH OBSERVATIONS, 1886.

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

Date, 1886.	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 SERPENTIS.									
May 14	M	2	1	6	0.153	F	+ 1.3	- 14.2	- 16.2
γ HERCULIS.									
F line broad and diffused at the edges.									
May 14	M	1	1	6	0.153	F	- 1.1	- 36.9	- 38.8
α OPHIUCHI.									
F line dark, very broad, and diffused at the edges. Estimated breadth, 34 tenth-metres; central portion, 10 tenth-metres. No very marked central condensation.									
July 5	M	2	1	6	0.150	F	+ 5.7	- 19.7	- 19.6
γ DRACONIS.									
b lines sharp and distinct.									
June 29	M	2	1	6	0.124	b ₁	+ 0.9	+ 20.9	+ 33.7
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 6	M	2	1	6	0.150	F	+ 0.0	- 12.9	- 11.9
August 10	N	2	1	6	0.114	F	+ 4.8	- 29.7	- 31.3
October 13	M	2	1	6	0.105	F	+ 8.7	- 60.8	- 48.6
	M	2	1	6	0.103	F	+ 8.5	- 58.6	- 44.8
α AQUILÆ (<i>Altair</i>).									
F line dark; very broad, and diffused at the edges. Estimations of breadth very discordant.									
July 6	M	2	1	6	0.150	F	- 4.3	- 23.7	- 21.5
August 10	N	2	1	6	0.114	F	+ 4.9	- 31.2	- 32.8
October 18	M	2	1	6	0.105	F	+ 16.1	- 67.6	- 54.4
	M	1	1	6	0.103	F	+ 16.2	- 42.9	- 38.5

Date, 1886.	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 CYGNI.									
F and <i>h</i> lines narrow, but somewhat faint.									
June 29	M	2	1	6	0.124	<i>h</i> ₁	- 6.9	+ 9.9	+ 12.2
α CYGNI.									
F line narrow and fairly dark ; <i>h</i> lines narrow but faint.									
June 29	M	2	1	6	0.124	<i>h</i> ₁	- 7.4	+ 0.5	- 0.6
July 6	M	2	1	6	0.150	F	- 6.8	- 22.1	- 23.0
October 18	M	2	1	6	0.105	F	+ 7.3	- 55.3	- 45.6
α PEGASI.									
F line broad and diffused at the edges.									
January 27	M	4	1	186	0.154	F	+ 12.4	- 34.4	- 26.1
February 1	M	2	1	6	0.104	F	+ 11.2	- 35.8	- 25.1
August 11	N	2	1	6	0.114	F	- 9.3	+ 3.4	+ 5.4
MARS.									
March 17	M	4	1	6	0.153	<i>h</i> ₁	...	+ 10.8	+ 15.9
23	N	4	1	186	0.190	<i>h</i> ₁	...	- 6.9	- 9.0
April 6	M	2	1	6	0.218	F	...	+ 2.3	+ 1.5
22	N	1	1	6	0.137	F	...	+ 1.8	0.0
30	N	2	1	6	0.175	F	...	+ 5.1	+ 4.0
May 4	M	4	1	6	0.135	F	...	- 7.2	- 7.4
VENUS.									
January 16	M	10	1	169	0.150	F	...	- 6.8	- 7.7
27	M	10	1	186	0.201	F	...	- 13.6	- 7.6

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

Date, 1886.	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.	
MOON.										
January 18	N	4	1	186	0'150	F	...	+ 2'5	...	
March 17	M	5	1	6	0'153	b ₁	...	— 0'1	...	
May	13	M	5	1	6	0'153	F	...	+ 0'2	...
	15	M	5	1	6	0'103	F	...	— 1'1	...
	18	N	4	1	6	0'180	F	...	— 1'5	...
	20	N	4	1	6	0'230	F	...	— 4'6	...
June 15	N	4	1	6	0'150	b ₁	...	— 5'4	...	
August 10	N	5	1	6	0'114	F	...	— 1'9	...	
November	5	M	5	1	6	0'148	F	...	(+ 5'5)	...
	18	M	5	1	6	0'119	F	...	+ 0'3	...
December 4	M	5	1	6	0'206	F	...	+ 0'9	...	
SKY.										
January 28	M	5	1	186	0'154	F	...	+ 1'2	...	
February 2	M	5	1	6	0'104	F	...	+ 3'2	...	
March	4	M	5	1	6	0'190	F	...	— 2'1	...
	24	N	3	1	186	0'190	F	...	— 2'5	...
May 3	M	5	1	6	0'140	F	...	— 0'6	..	
June	8	M	5	1	6	0'165	b ₁	...	+ 4'1	...
	29	M	5	1	6	0'124	b ₁	...	— 0'9	...
July 6	M	5	1	6	0'150	F	...	+ 1'8	...	
November 30	M	5	1	6	0'173	F	...	— 2'0	...	
ROTATION OF JUPITER.										
Displacement between the <i>p</i> and <i>f</i> limbs.										
May 15	M	5	1	32	0'103	F	...	+ 32'3	...	

OBSERVATIONS OF THE SPECTRA of 51 SCHJELLERUP, NOVA ORIONIS, and of COMETS 1885 and 1886, made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1886.

51 SCHJELLERUP.

1886, January 6.

Single-prism Spectroscope.

Observer, M.

The Spectrum was very faint, and not seen at all well. It consisted mainly of a bright strip lying between *b* and D, and interrupted by one dark band in the yellow. This bright strip was bounded towards the blue by a broad dark shaded band in the green near *b*, the light beyond being so feeble that the sharp edge of the band might be almost said to terminate the spectrum in that direction. Towards the red, the bright strip was bounded by another dark band near D, which might in like manner be almost said to terminate the spectrum in that direction, only a very feeble light being traceable beyond it.

The star spectrum was compared with the spectrum from a Bunsen flame, and the bright band in the green of the Bunsen flame was seen to be closely coincident with the dark band in the green in the star spectrum. The coincidence of the bright band in the yellow of the flame spectrum with the dark band in the yellow of the star spectrum could not be directly observed so satisfactorily. A measure however appeared to show that it was very close. The third band in the spectrum of the flame, that in the blue, was not compared with the star spectrum, that region of the star spectrum being too faint for examination.

The following measures of the positions of the sharp edges of the bands in the green and yellow of the spectrum of the star, as compared with the corresponding bands of the spectrum of the Bunsen flame, were obtained :—

Objects Compared.	Band Observed.	Micrometer Readings.	Displacement.		Inferred Wave-length of Star Band.	Mean Inferred Wave-length.
			In Revolutions.	In Wave-length.		
Star	Green band	r 0.389	r + 0.107	tenth-metres. — 4.3	tenth-metres. 5159.7	} 5162.2
Bunsen flame	do.	0.282				
Star	Green band	0.983	— 0.016	+ 0.6	5164.6	
Bunsen flame	do.	0.999				
Star	Yellow band	0.695	+ 0.024	— 1.3	5631.7	5631.7
Bunsen flame	do.	0.671				

Thalén's wave-lengths for the less refrangible edges of the bands in the spectrum of the Bunsen flame have been assumed as follows :—

	Band.	Wave-length.
	Green band	tenth-metres. 5164.0
	Yellow band	5633.0

NOVA ORIONIS.

1886, January 6.

Single-prism Spectroscope.

Observer, M.

No details additional to those seen on 1885, December 29, were made out; indeed the spectrum was not seen so well now as on the former occasion.

1886, January 11.

Single-prism Spectroscope.

Observer, M.

The star was now much fainter and paler than on December 29 and January 6. The red and blue ends were too faint for any details whatsoever to be made out in them, and the beauty of the spectrum as it had been seen on December 29 was quite lost, the vivid alternations of light and darkness being now not nearly so conspicuous and well defined.

Only three dark bands were clearly seen, and these could not be satisfactorily measured. These were bands V., VI., and VII. of the numeration employed in the observations of β Pegasi made on 1876, October 18; wave-lengths as then determined, λ 5450, λ 5164, λ 4953. In Dunér's nomenclature, these are bands 6, 7, and 8. Immediately beyond band VI. towards the blue, the spectrum was, relatively, very bright, and might well have been supposed to indicate the presence of bright lines, but this district is always very bright in stars of this type. The dark bands seemed narrower, and not so dark as on December 29, and the bright intervals or zones far less bright than on that occasion, the zone just alluded to being the only one retaining any large proportion of its former brilliancy. It is clear therefore that the diminution of the light of the star was not accompanied by an increase in the breadth and darkness of the dark bands, but by a diminution in brightness of the general continuous spectrum.

COMET *c* 1885 (BARNARD).

1886, March 31.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The comet was very faint and great difficulty was experienced in bringing it on to the slit of the spectro-scope. The spectrum consisted of the usual three bright bands, sharp towards the less refrangible edge, and shading off towards the more refrangible. Of these the one in the blue could only just be discerned; the one in the green was as usual very much brighter at its sharp edge than was the one in the yellow, but it was not traceable so far towards the blue, for whilst the yellow band was traceable almost up to the green band, the latter could only be traced to about λ 4965.

The green band appeared to be about 72" in height, the yellow band about 43" or 45" or perhaps even 48" or 50"; but the yellow band was nearly as high at its faintest point as at its brightest. It did not fade away rapidly towards the blue as the green band did, but continued with very little diminution of brightness for a long distance from its bright edge. There was, however, a broad distinct dark gap between the last trace of the yellow band and the bright sharp edge of the green band.

There was no trace of a continuous spectrum seen, although the comet showed a distinct stellar nucleus. It was not found possible to get any satisfactory measures, but it was quite clear that the green band coincided very nearly if not exactly with the green band of the spectrum of the Bunsen flame, and not with the green band of the spectrum from a vacuum tube filled with carbonic dioxide. Indeed, if there was any want of coincidence with the spectrum of the Bunsen flame, the comet band lay towards the blue of the band of the Bunsen flame, and not towards the red.

The height of the blue band of the comet spectrum was about 29". The yellow band was traced from about λ 5633 to λ 5236.

1886, May 4.

Half-prism Spectroscope ; one "half-prism" direct.

Observer, M.

The comet was not observed until the dawn was very far advanced ; and the spectrum could only be seen from the actual nucleus, as the light from the sky was so strong as quite to overpower the light from the coma and tail of the comet. The blue and green bands were seen, the latter being particularly well defined.

The following measures were obtained of the Green Band :—

Date, 1885. Greenwich Civil Time.	Object.	Micrometer Readings.	Displacement.		Inferred Wave-length of Comet-band.
			In Revolutions.	In Wave-lengths.	
May 4. 3. 35	Comet	0.507	+ 0.128	tenth-metres. + 1.3	tenth-metres. 5165.3
	Bunsen-flame	0.379			
3. 45	Comet	0.568	— 0.058	— 0.6	5163.4
	Bunsen-flame	0.626			
Mean.....					5164.4

The comet was lost in daylight immediately after the second measure.

Thalén's wave-length for the less refrangible edge of the green band in the spectrum of the Bunsen-flame has been assumed, viz.:

tenth-metres
5164.0

COMET *f* 1886 (BARNARD-HARTWIG).

1886, December 14.

Half-prism Spectroscope ; one "half-prism" direct.

Observer, M.

Great difficulty was experienced in bringing the comet on to the slit of the spectroscope. Finally, however, a good view of the spectrum was obtained. The three ordinary bands were seen very easily, but none of them were sharply defined. A faint continuous spectrum,—whether from general sky illumination, or from the comet itself, was not determined,—spread over the field, and much interfered with observation. The following measures were obtained of the sharp less refrangible edge of the green band in the spectrum of the comet as compared with Mg_3 of the magnesium spectrum. The comet was lost in the murkiness of the lower atmosphere before any measures could be secured of the other bands.

Objects compared.	Micrometer Readings.	Displacement.		Inferred Wave-length of Comet-band.
		In Revolutions.	In Wave-lengths.	
	r	r	tenth-metres.	tenth-metres.
Comet	0.291			
Mg ₃	202	+ 0.089	+ 0.93	5167.81
Comet	0.328			
Mg ₃	202	+ 0.126	+ 1.31	5168.19
Comet	1.092			
Mg ₃	972	+ 0.120	+ 1.25	5168.13
Comet	0.250			
Mg ₃	508	— 0.258	— 2.68	5164.20
Mean.....				5167.08

Ångström's wave-length for b_4 , 5166.88 tenth-metres has been assumed as the wave-length of the Mg_3 line of Magnesium.