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Stars with Remarkable Spectra.

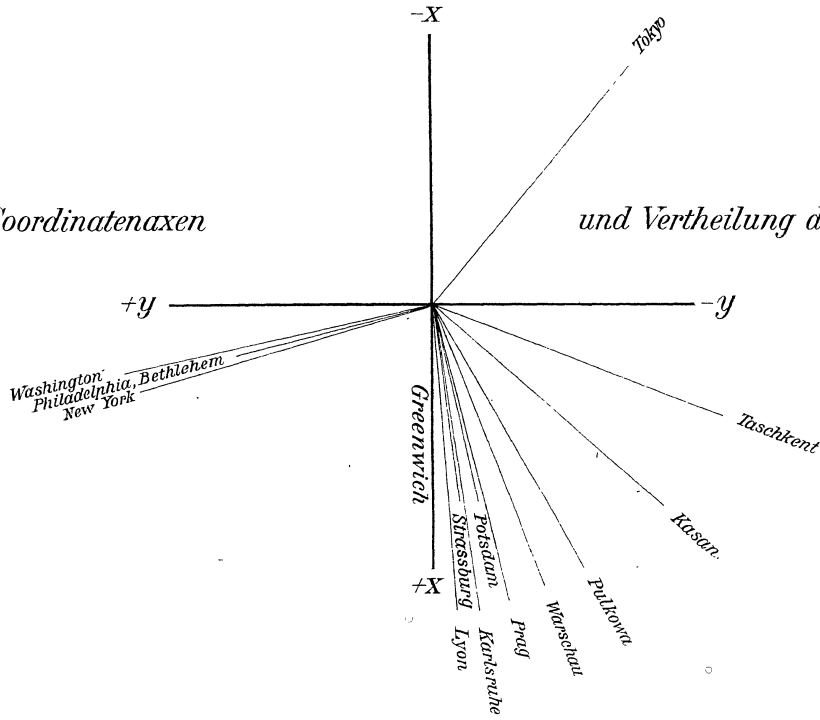
By *T. E. Espin.*

The numbers are continued from *Astr. Nachr.* No. 3559 and the method and details of the observations have been the same as in previous years.

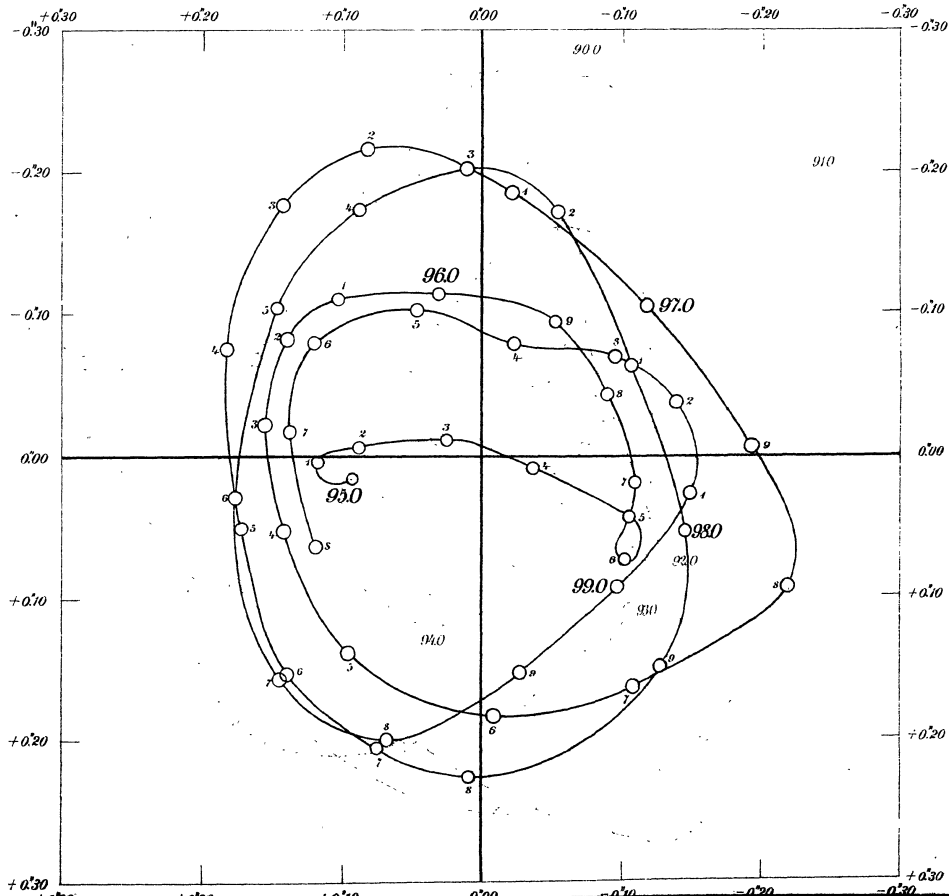
No.	BD.	α 1900	δ 1900	BD.	Obs.	Col.	Sp.	1899	Remarks
1330	+31° 144	0 ^h 51 ^m 5	+31° 20'	7.9	7.8	OR	III!!	Oct. 30	
1331	+56. 194	1 0.4	+57 2	9.5	9.2	OR	III!!	Aug. 15	? Faint
1332	+56. 210	1 4.1	+56 30	9.1	8.9	OR	III!!	» 15	
1333	+30. 180	1 5.4	+30 49	9.0	8.6	R	III!!	Oct. 30	
1334	+56. 229	1 9.1	+56 50	9.5	9.1	OR ¹	III!!	Aug. 15	
1335	Anon.	1 13.8	+56 58	—	8.9	OR	III!!!	» 15	
1336	+56. 269	1 19.0	+57 7	8.6	8.4	OR ¹	III!!	» 15	
230	Anon.	1 27.1	+57 14	—	9.0	RR	IV!	» 15	Note
1337	+22. 947	5 28.7	+22 6	9.0	9.3	R	B	Jan. 13	Note
1338	+25.2109	9 25.3	+25 29	8.5	8.0	OR	III!!	» 16	
1339	+49.2086	11 43.0	+49 5	8.3	8.0	OR	III!!	Febr. 15	
1340	+24.2796	14 50.4	+24 0	7.8	7.7	OR	III!!	May 4	
1341	+23.2780	15 4.9	+23 10	8.7	8.2	OR	III!!	» 4	? Twilight
1342	+24.2869	15 24.0	+24 2	8.1	7.8	OR	III!!	» 4	
—	R Coron.	15 44.4	+28 8	var.	—	—	—	» 4	Note
1343	+24.2947	15 53.6	+24 41	7.8	7.5	OR	III!!	» 4	
—	T Coron.	15 55.3	+26 12	—	9.3	—	—	» 4	
1344	+29.2824	16 21.1	+29 28	8.9	8.9	RR	III!!!	» 7	Fine object
1345	+29.2840	16 26.9	+29 25	8.5	8.7	OR	III!!	» 7	
1346	+28.2662	17 0.8	+28 49	8.1	8.5	OR	III!!	» 4	
1347	+36.2843	17 10.9	+36 29	7.8	8.0	OR	III!!!	Aug. 30	Note
1348	+29.2978	17 13.7	+29 1	7.0	6.8	OR	III!!	May 7	
1349	+28.2745	17 23.4	+28 40	8.2	8.2	OR ¹	III!!	» 7	
1350	+29.3054	17 30.5	+29 50	8.1	8.0	OR	III!!	» 7	
1351	+28.2834	17 43.8	+28 26	9.2	9.0	R	III!!!	» 7	
1352	+30.3068	17 47.1	+30 7	8.3	8.3	OR	III!!	» 7	
1353	+33.2976	17 48.4	+33 56	8.5	8.6	OR	III!!	Aug. 30	
1354	+33.2996	17 53.8	+33 49	8.5	8.7	OR	III!!	» 30	
1355	+28.2927	18 3.8	+28 52	9.2	9.1	OR	III!!!	May 7	? Faint
1356	+37.3622	19 45.4	+37 7	9.4	9.2	R	III!!!	Sept. 4	
1357	+26.3750	19 54.7	+26 36	9.5	8.9*	R	III!!!	» 3	Var.?
1358	+36.3792	19 54.8	+36 55	9.2	8.9	OR	III!!	» 4	
1359	+36.3812	19 56.9	+36 51	9.0	8.8	R	III!!!	» 4	Fine object
1360	Anon.	19 58.1	+39 46	—	9.1	RR	IV!!	Aug. 1	Note
1361	Anon.	20 8.0	+22 32	—	9.2	R	B	Sept. 2	Note
1362	Anon.	20 9.8	+36 32	—	9.5	R	III!!	» 4	
1363	+46.2892	20 12.7	+46 36	9.5	9.1	OR	III!!!	» 8	
—	+30.3995	20 17.4	+30 33	7.6	8.0	OR	III!	» 3	Br. 14. Note
—	+31.4046	20 17.6	+32 0	7.9	8.5	OR ¹	III	» 3	Br. 15
—	+30.4005	20 18.6	+30 56	6.5	7.6	OR ¹	II	» 3	Br. 16
—	+31.4056	20 18.8	+31 13	7.0	8.3	OR ²	II	Aug. 23	Br. 17
1364	+48.3107	20 19.7	+48 11	8.4	8.6	OR	III!!	» 12	
1365	+31.4101	20 24.9	+31 54	9.3	9.0	R	III!!	Sept. 3	
1366	+46.2970	20 30.0	+46 13	9.5	9.1	OR	III!!	» 8	
—	+31.4152	20 31.7	+32 6	8.6	8.3	OR	III!!	Aug. 22	Br. 19. Note
—	Anon.	20 32.7	+32 3	—	9.1	R	—	» 22	Br. 20. Note
1367	+54.2382	20 33.1	+54 15	9.0	9.1	OR	III!!	» 11	? Misty
1368	Anon.	20 34.5	+42 19	—	9.2	R	III!!	» 1	? Faint
—	+31.4213	20 41.9	+31 55	8.2	7.8	OR	III!!	» 22	Br. 21. Note
1369	+45.3262	20 42.3	+45 50	8.7	9.0	OR	III!!	» 15	

Lage der Coordinatenaxen

und Vertheilung der Stationen.



Bewegung des Nordpols der Erdaxe.



No.	BD.	α 1900	δ 1900	BD.	Obs.	Col.	Sp.	1899	Remarks
1370	Anon.	20 ^h 43 ^m 9	+44°42'	—	9.2	R	III!!	July 30	? Faint
—	+45°3271	20 43.5	+45 41	—	7.8	R	?	Aug. 13	Es.-Birm. 688. Note
—	+30.4185	20 44.5	+30 25	7.5	7.8	OR	II	» 28	Br. 22. Note
—	+30.4191	20 45.5	+30 16	8.1	7.9	OR ¹	II	Oct. 2	Br. 23
1371	+31.4234	20 45.8	+31 58	9.4	9.1	OR	III!!	Sept. 3	? Faint
1372	+45.3302	20 47.5	+45 52	9.4	9.1	OR	III!!	Aug. 15	
—	+32.3980	20 49.8	+33 4	6.0	5.3	OR	II!	» 22	Br. 24. Note
1373	Anon.	20 50.2	+45 40	—	9.3	R	III!!	» 15	? Faint
918	—	20 50.9	+44 53	—	—	—	—	July 30	Note
1374	+32.3988	20 51.2	+32 15	9.1	8.9	OR	III!!	Sept. 3	
—	+32.3989	20 51.3	+32 18	7.2	7.3	OR ¹	II	Aug. 22	Br. 25. Note
—	+31.4268	20 51.7	+31 43	7.6	7.8	OR ²	II?	» 22	Br. 26. Note
1375	+45.3329	20 51.9	+45 36	9.2	9.0	OR	III!!	» 13	? Note
—	+29.4253	20 54.1	+30 6	6.7	7.9	OR ¹	II	Oct. 2	Br. 27
1376	+49.3424	20 54.6	+50 2	9.0	9.0	OR	III!!	Aug. 12	? Misty
—	+31.4304	20 55.9	+32 7	7.0	7.6	OR	III!!	» 22	Br. 28. Note
1377	Anon.	20 55.9	+43 34	—	9.4	R	IV?	» 30	
1378	+42.3935	20 56.4	+42 15	9.4	8.9	R	III!!	» 1	? Faint
1379	+48.3265	20 57.6	+49 8	8.4	8.3	OR	III!!	» 12	
—	+31.4320	20 58.9	+31 57	7.2	7.7	OR ¹	—	» 22	Br. 29. Note
1380	+37.4158	20 59.1	+37 18	9.2	9.1	R ¹	III!!	Sept. 4	
1381	+49.3442	20 59.1	+49 23	9.0	9.1	OR	III!!	Aug. 12	
1382	Anon.	21 6.5	+42 21	—	—	R	B	» 1	
1383	+45.3434	21 6.9	+45 50	8.8	7.9*	OR	III	» 13	Var.?
—	+30.4352	21 8.1	+30 30	8.2	8.2	OR	III?	Oct. 2	Br. 30
1384	+37.4239	21 10.8	+37 54	9.4	9.2	R	III!!!	Sept. 4	
1385	Anon.	21 12.6	+53 54	—	9.2	R	IV?	Aug. 11	
1386	Anon.	21 14.7	+43 4	—	9.0	R	III!!!	July 30	
1387	+22.4364	21 14.7	+23 4	8.2	8.3	OR	III!!!	Sept. 2	
—	+31.4416	21 14.9	+31 46	7.3	7.5	OR	—	Aug. 22	Br. 31. Note
1388	+49.3500	21 15.4	+49 18	9.4	9.3	R	IV?	» 12	
1389	+53.2600	21 16.6	+53 54	9.2	8.9	OR	III!!	» 11	
—	+30.4410	21 17.5	+30 22	8.4	8.4	OR	III?	Oct. 2	Br. 32
—	+30.4411	21 17.8	+30 30	9.2	8.8	OR ¹	?	» 2	Br. 33
—	+29.4397	21 18.4	+29 53	6.5	6.8	OR ²	II	» 2	Br. 34
1390	+23.4298	21 19.0	+23 53	8.5	8.6	OR	III!!!	Sept. 2	
—	+30.4421	21 19.2	+30 41	7.8	7.8	OR	II	Aug. 28	Br. 35
1391	+35.4526	21 22.2	+35 24	7.9	8.0	R	III!!!	July 29	
—	+29.4419	21 24.1	+29 47	7.5	—	OR	II	Aug. 28	
1392	Anon.	21 26.4	+50 50	—	9.1	OR	III!!	» 15	
1393	+48.3403	21 27.8	+48 47	9.4	9.0	OR	III!!	Sept. 8	
—	+29.4440	21 28.2	+30 8	8.2	8.2	OR	II	Aug. 28	Br. 37. Note
1394	+45.3583	21 28.7	+46 2	9.5	9.3	OR	III!!!	» 13	
1395	Anon.	21 30.0	+43 43	—	9.4	R	III!!	» 1	? Faint
—	+30.4479	21 31.4	+30 33	8.0	8.5	OR	III?	» 28	Br. 38. Note
1396	+48.3433	21 32.0	+48 57	9.0	8.6	OR	III!!	» 12	
1397	+31.4504	21 32.2	+31 39	7.8	7.4	OR	III!!!	Sept. 3	
—	+31.4505	21 32.3	+32 0	7.7	7.6	OR	III?	Aug. 22	Br. 39. Note
1398	+48.3441	21 33.5	+48 13	9.3	9.3	R	III!!!	» 12	
1399	Anon.	21 34.6	+53 47	—	9.2	OR	III!!	» 11	? Faint
1400	+43.4004	21 36.4	+43 29	9.0	8.6	OR	III!!	July 30	
1401	+21.4599	21 36.5	+21 46	7.5	8.0	OR	III!!	Sept. 2	
—	+29.4481	21 36.6	+29 51	7.7	8.0	OR	—	Aug. 28	Br. 40. Note
—	+29.4496	21 40.0	+29 52	8.2	7.8	OR	III	» 23	Br. 41. Note
1402	+49.3616	21 42.4	+49 28	9.1	8.8	OR	III!!	Sept. 8	
1403	+23.4391	21 42.6	+23 23	9.3	9.0*	R	III!!!	» 2	

No.	BD.	α 1900	δ 1900	BD.	Obs.	Col.	Sp.	1899	Remarks
1404	+46°3433	21 ^h 42 ^m 8	+46° 57'	9.4	9.1	OR	III!!	Aug. 13	
1405	+53.2736	21 51.6	+54 0	9.0	8.6	RR	IV!!	» 11	Note
1406	+53.2741	21 51.8	+53 26	9.1	9.0	OR	III!!	» 11	? Faint
1407	+53.2748	21 54.8	+54 5	9.1	8.7	OR ¹	III!!	» 11	
1408	+47.3649	21 56.1	+47 15	9.5	9.1	OR	III!!	» 13	
1409	+50.3530	21 58.5	+50 44	9.5	9.1	OR	III!!	» 15	
1410	+54.2672	21 58.7	+54 14	9.1	9.0	OR	III!!	Sept. 14	
1411	+54.2674	21 58.9	+54 26	9.1	8.7	OR	III!!	» 14	
1412	+23.4457	21 59.3	+23 34	9.1	8.8	OR	III!!	» 2	
1413	+23.4470	22 3.7	+23 50	8.7	8.6	OR ¹	III!!	» 2	
1414	+57.2474	22 6.2	+57 55	9.1	9.1	OR	III!!	Oct. 28	? Faint
1415	+21.4724	22 12.6	+21 31	8.1	8.0	OR ¹	III!!	Aug. 23	
1416	+47.3760	22 13.2	+47 26	9.0	8.7	OR	III!!	» 13	
1417	Anon.	22 23.4	+46 40	—	9.4	R	III!!	» 1	? Faint
1418	+21.4820	22 39.7	+21 25	7.8	8.2	OR	III!!	» 23	
1419	+58.2548	23 3.4	+58 20	9.0	8.9	OR	III!!	Oct. 28	
—	V Cassiop.	23 7.4	+59 8	—	8.0	R	III!!!	Aug. 1	Type of Mira
1420	+55.2927	23 10.5	+55 23	9.4	9.2	OR	III!!	» 11	? Faint
1421	+50.4001	23 12.8	+50 17	8.0	8.4	OR ¹	III!!	» 1	
1422	+55.2939	23 15.0	+55 21	9.4	8.0*	OR ¹	III!	» 11	Var.? Note
—	+28.4643	23 43.2	+28 17	8.8	9.0	OR ¹	III!	» 28	
1423	+56.3126	23 54.1	+56 31	9.1	dpl.	—	?	» 13	Note
1424	+56.3125	23 54.1	+56 25	9.5	9.0	OR	III!!	» 13	? Faint

Notes.

230. Of this star Krüger says (Cat. der farbigen Sterne p. 9): »Hier steht am Himmel kein Stern, und der von E. beobachtete Stern ist vermuthlich +57°325«. The observation of 1887 Nov. 15 is however quite clear. The circle readings give its difference as f 1^m5^s, s 15' of +57°349. Moreover a diagram of the field was made showing both +57°349 and +57°325 in which it is shown as sp. the latter star. On 1894 Oct. 22 its place was redetermined from +57°325. The following give the two places:

1887 Nov. 15 1^h24^m9^s +56° 59' (1855)

1894 Oct. 22 1 24 11.6 +56 59.8 (1855)

The last being the more accurate. The observed magnitudes are:

1887 Nov. 15 9.8

1894 Oct. 22 9.0 IV?

1899 Aug. 15 9.0 IV!

The star may be variable.

1337. Decided red, nf. M. 1, bands obvious IV? mag. 9.3. Jan. 14 mag. 9.2.

R Coronae. Fully 6.0 mag., yellow, spectrum apparently II, Magnesium (?) strong. With high dispersion many fine lines. Magnesium (?) seems to have a brightness on less refrangible side. Some other bright lines suspected.

1347. 1895 April 22 7.8, OR, III!!

1360. Declination may be some minutes wrong.

1361. Between +22°3971 and +22°3966, at first IV, afterwards thought to be III. Faint.

Br. 14. The first star of the second list of Red and Ruddy Stars published in the »English Mechanic« Vol. LXX No. 1798 (Sept. 8, 1899) by Mr. Brocklebank.

Br. 19. Sept. 3 8.5, OR, III!!
Br. 20. Sept. 3 9.1, III!!! ? Faint, Oct. 2 no alteration. Suspected to be a variable star as it is not in the BD.

Br. 21. Sept. 3 8.4, OR, III!

Es.-Birm. 688. Spectrum not III, and I think not IV, one large band like an exaggerated II. Aug. 15 imperfect III?

Br. 22. Oct. 2 7.3, OR, II!

Br. 24. Sept. 3 6.0, OR, II! Es.-Birm. I.561. Krüger 1824.

918. July 30 10.0, R, III!!! ? Faint. Aug. 30 now 9.4, III? In Cl. NGC. 6989, var?

Br. 25. Sept. 3 8.0, OR¹, II.

Br. 26. Sept. 3 8.3, OR¹, III.

1375. Identification somewhat doubtful.

Br. 28. Sept. 3 7.3, OR, III!!

Br. 29. Sept. 3 7.5, OR, III?

Br. 31. Sept. 3 7.5, OR¹, II.

Br. 37. Oct. 2 8.3, OR, II.

Br. 38. Oct. 2 8.0, OR², II.

Br. 39. Sept. 3 7.6, OR¹, II.

Br. 40. Oct. 2 7.0, OR¹, II!

Br. 41. Oct. 2 7.6, OR², II.

1405. Sept. 14 8.7*. AG. Cambr. Zones 1874 Oct. 22 8.7, 1883 Oct. 11 9.2, may be variable as it is strange that it has escaped detection so far.

1422. Oct. 28 8.1*. There is either a mistake in the BD.-magnitude, or the star is variable. AG. Hels. Zones 1869 Sept. 6 8.6, 1871 Oct. 6 8.5. *)

1423. Double 9.3, 9.8 white and very red. Comes IV? the spectra overlap. AG. Hels. Z. 109 1870 Oct. 12 »dupl. 16" sq.; com. 9.5«. The mean of my measures give

*) Vgl. meine Notiz über diesen Stern A. N. 2882 Bd. 121 p. 24. K7.

$P. = 224^{\circ}3$, $D. = 18^{\circ}17$. This shows a reversal of angle compared with the Helsingfors observations and suggests variation. I have however seen no variation upto the end of the year.

The following 11 stars were observed as III!:

- +22°2841, 4102; +23°4406; +28°2738, 2822;
- +29°2946; +34°2961, 4557; +46°3798; +47°3187;
- +50°3523;

and the following 144 as II or III:

- +20°2933, 2945, 3024;
- +22°4025, 4028, 4034, 4048, 4188, 4207, 4223, 4332, 4460, 4463, 4465, 4480;
- +23°2736, 2737, 2775, 2776, 4233, 4243, 4307, 4315, 4317, 4325, 4445;
- +24°2104, 2786, 2790, 2954; +25°2776, 2839;
- +27°2538, 3572, 3574; +28°2787, 2803;
- +29°183, 184, 2565, 2629, 2933, 4496;

- +30°31, 59, 172, 182; +33°2997, 3006, 3007, 3009;
- +34°2436, 2889, 2928, 2965, 4417, 4542;
- +35°3020, 3041, 3042, 3059, 3098, 3130, 4600, 4643;
- +36°3885, 4138;
- +37°2885, 2888, 3631, 3658, 4000, 4005, 4079, 4175, 4179, 4229, 4433;
- +38°2924; +41°3954;
- +42°3872, 3876, 3893, 4195, 4247, 4250, 4304, 4441;
- +43°4144; +44°3897, 3984;
- +45°3287, 3305, 3792, 3799, 3801, 3883;
- +46°2778, 2969, 3180, 3267, 3284, 3322, 3329, 3330, 3335, 3370, 3661, 3671;
- +47°3327, 3638, 3841, 3991;
- +48°1987, 3451, 3521, 3573, 3633, 3643, 3689, 3727;
- +49°2052, 2079, 3400, 4078; +50°3353, 3382, 3392;
- +51°1679, 3444; +52°3179, 3414;
- +53°2659, 2740, 2817, 2953, 2957; +54°2828;
- +55°245, 2990, 3028; +56°221; +57°2515, 2815.

New Nebulae.

- 1) 5^h55^m56^s +24° 9' (1855) Jan. 11 coarse cluster, a nebulous object on photographic plate
- 2) 5 55 59 +24 2 » Jan. 11 Cl., triangular in shape, stars 9.5-14
- 3) 20 42 46 +43 50 » Sept. 7 faint
- 4) 20 44 41 +42 0 » Sept. 7 very faint
- 5) 20 45 49 +43 50 » Sept. 7 faint and diffused
- 6) 21 47 54 +46 35 » Aug. 13, 15 large, faint glow about 8', well seen each night.

Tow Law, Durham, England, 1900 Jan. 15.

T. E. Espin.

Elliptische Elemente und Ephemeriden des veränderlichen Sterns Y Cygni.

Von N. C. Dunér.

Im Jahre 1898 haben ich und Herr Dr. Bergstrand die folgenden Minima von Y Cygni beobachten können:

Epoche	M. Z. Greenw.	Beob.
2774	1898 April 26 ^d 12 ^h 5 ⁵⁹	Du
2776	» » 29 11 39.4	Du
2854	» Aug. 24 8 31.6	Du
2861	» Sept. 3 13 30.4	Du
2895	» Oct. 24 12 23.6	Be
2902	» Nov. 4 5 44.5	Du
2902	» » 4 6 5.7	Be
2906	» » 10 6 1.7	Be
2907	» » 11 11 56.7	Be

grossen und gleich hellen Componenten des Sterns beschriebenen Bahn ausgeführt. Für die näheren Details dieser Bahnbestimmung weise ich auf eine bald erscheinende ausführlichere Abhandlung hin. Nur so viel mag hier gesagt werden, dass unter der Hauptepoche t_0 die Zeit verstanden werden soll, wo gleichzeitig der Perihel- (möglicherweise der Aphel-) Durchgang stattfand und die Apsidenlinie der Bahn mit der Gesichtslinie zusammenfiel; unter ω der Winkel, mit welchem die Apsidenlinie während eines halben anomalistischen Umlaufs sich in der Bahnebene dreht. Als Einheit für die halbe grosse Axe der Bahn gilt der Radius der Sterne. Dass man bis auf Weiteres annehmen muss, dass die Gesichtslinie exact in der Bahnebene liege, und dass die Lage der Knotenlinie weder jetzt noch je bestimmt werden kann, da dieselbe keinen Einfluss auf den Lichtwechsel des Sterns ausübt, ist selbstverständlich.

Mit diesen und allen anderen veröffentlichten Beobachtungen der Minima dieses Sterns habe ich eine Bestimmung der elliptischen Elemente der von den zwei gleich

Elemente von Y Cygni.

Hauptepoche	$t_0 = 1885.0 + 342^d 8930$
Anomalistische Bewegung der Apsidenlinie	$\omega = 0^{\circ} 035928$
Excentricität der Bahn	$e = 0.14535$
Anomalistische Umlaufszeit	$U = 2^d 996933$
Halbe grosse Axe der Bahn	$a = 8.0$

Diese Elemente stimmen wie folgt mit den Normalminimis überein: