to the third. Values of λ_{eff} were then calculated by the interpolation formula:

$$\lambda_{eff} = 4070 + 511 \log (a' + \cdot 683)$$

The comparison with observation shows that the representation is sufficiently good.

Example: A λ_{eff} of 4465 has been found at a zenith distance $Z = 57°$ corresponding to 1·830 atm transmitted. In Table 3 $\lambda_{eff} = 4465$ is placed at $a' = 5{\cdot}251$. Therefore $\lambda_{eff} = 4465$ reduced to the zenith is found at $a' = 5{\cdot}251 - {\cdot}830 = 4{\cdot}421$ and interpolated to be 4431.

On the period of X Sagittarii, by *Ejnar Hertzsprung*.

1. The variability of X Sgr was discovered by J. F. J. SCHMIDT, who during the years 1866 to 1879 made 2572 estimates of the star. Of these the 2250 most reliable ones have been used in the present note. A copy of the observations of X Sgr, made by SCHMIDT, was kindly lent to me from Potsdam by Professor LUDENDORFF.

By closer examination of SCHMIDT's estimates it was soon realized that his scale varied markedly from year to year. Accordingly mean lightcurves were prepared for each year separately. The phases of the individual observations were calculated by the formula:

$$\text{phase} = {\cdot}14261^{d^{-1}} \text{ (J. D. M. astr. T. Grw} - 2400000).$$

The main comparison star was 45 *d* Oph = Boss 4421, the difference between X Sgr and *d* Oph being estimated in steps, *s*. The sign of Δs is here made the same as that of Δm.

The observations from each year were arranged according to phase and divided into 7 groups. The mean values of phase and brightness thus found are given in Table 1.

TABLE 1.

2250 observations by J. F. J. SCHMIDT.

1866			1868			1870		
n	P	s	*n*	P	s	*n*	P	s
28	·0464	3·34	29	·0263	2·28	20	·1404	3·04
17	·1904	4·85	27	·1735	2·79	23	·2767	3·54
18	·3349	5·43	26	·3116	4·04	17	·4219	4·59
24	·4738	6·41	27	·4596	5·35	19	·5678	5·37
19	·6175	7·00	24	·6094	6·14	27	·7089	5·36
20	·7637	6·45	31	·7436	5·74	20	·8530	3·70
32	·9064	3·88	33	·8863	3·05	34	·9981	2·77
1867			**1869**			**1871**		
n	P	s	*n*	P	s	*n*	P	s
38	·1194	2·76	17	·0936	2·56	23	·0467	2·48
41	·2669	3·69	20	·2336	3·55	23	·1928	3·13
30	·4072	4·88	14	·3810	4·86	21	·3260	4·05
25	·5523	6·17	15	·5198	5·73	19	·4719	4·87
22	·6947	6·16	11	·6667	6·41	23	·6126	5·37
29	·8389	4·74	18	·8081	5·28	16	·7564	4·77
34	·9780	2·88	18	·9512	2·81	29	·9029	3·09

TABLE 1 (*continued*).

1872			1873			1874		
n	P	s	*n*	P	s	*n*	P	s
30	·1017	2·45	31	·0123	2·60	16	.0805	2·84
22	·2425	3·41	29	·1555	3·29	14	·2150	3·68
28	·3905	4·27	20	·2943	4·08	12	·3630	4·67
30	·5301	4·85	20	·4378	4·94	12	·4996	5·17
24	·6765	5·07	21	·5838	5·21	16	·6470	5·44
26	·8212	3·71	30	·7266	5·02	12	·7850	4·64
36	·9622	1·82	28	·8688	3·45	16	·9304	2·97
1875			**1876**			**1877**		
n	P	s	*n*	P	s	*n*	P	s
16	·1099	2·67	24	·0267	2·78	17	·0781	3·13
21	·2533	3·65	29	·1630	3·26	19	·2317	4·18
20	·3914	4·52	26	·3084	3·94	20	·3644	4·74
22	·5422	5·34	23	·4495	4·57	18	·5326	5·38
10	·6776	5·35	26	·5958	5·21	19	·6512	5·42
15	·8233	4·21	29	·7450	4·85	20	·7958	4·85
17	·9678	2·62	23	·8762	3·50	25	·9340	3·28
1878			**1879**					
n	P	s	*n*	P	s			
24	·1305	3·01	23	·0366	2·87			
28	·2776	4·11	26	·1873	3·54			
21	·4186	5·02	27	·3236	4·37			
21	·5585	5·69	22	·4671	5·20			
20	·6988	5·86	22	·6090	5·78			
25	·8434	4·31	24	·7554	5·52			
25	·9782	2·88	29	·8943	3·64			

By means of linear formulae, $s' = a\,(s - b)$, the constants *a* and *b* of which are given for each year in Table 2, the original estimates *s* were reduced to a mean scale *s'*. The zero point of *s'* is so chosen, that the points on the ascending and descending branch of the lightcurve, where $s' = 0$, are separated by half the period.

All the 2250 estimates were then arranged according to phase and divided into 25 groups of 90 observations each. The results are given in Table 3 and plotted in Figure 1.

The mean error of a single original estimate was found to be $\pm$ s·72. After reduction to the scale of *s'* the m.e. diminished to $\pm$ s'·59.

These mean errors correspond to about $\pm$ ·24 and $\pm$ ·20 respectively in fractions of the total range, which is approximately 3s·04. This calculation does not take possible systematic errors in the estimates into account

TABLE 2.

	n	a	b
			s
1866	158	·84	5·40
67	219	·85	4·47
68	197	·79	4·20
69	113	·79	4·59
70	160	1·13	3·95
71	154	1·06	4·05
72	196	·94	3·90
73	179	1·19	4·22
74	98	1·14	4·39
75	121	1·03	4·13
76	180	1·27	4·08
77	138	1·27	4·61
78	164	1·00	4·50
79	173	1·04	4·49

TABLE 3.

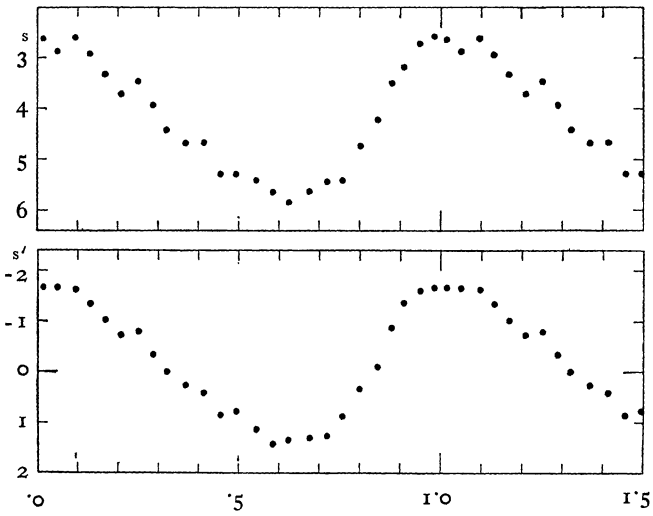
General mean values of 2250 estimates by J. F. J. SCHMIDT.

n	mean phase	mean original estimate	red. to mean scale	m_{pg} VOÛTE's scale
	P	s	s	m
90	·0157	2·633	— 1·674	— ·792
90	·0507	2·878	— 1·658	— ·787
90	·0967	2·611	— 1·626	— ·777
90	·1322	2·929	— 1·345	— ·684
90	·1689	3·329	— 1·016	— ·575
90	·2082	3·714	— ·723	— ·479
90	·2509	3·468	— ·792	— ·501
90	·2880	3·931	— ·342	— ·353
90	·3216	4·415	— ·000	— ·240
90	·3683	4·679	+ ·273	— ·150
90	·4131	4·671	+ ·427	— ·099
90	·4551	5·286	+ ·869	+ ·047
90	·4938	5·282	+ ·793	+ ·022
90	·5455	5·408	+ 1·134	+ ·134
90	·5860	5·637	+ 1.414	+ ·277
90	·6256	5·839	+ 1·338	+ ·202
90	·6775	5·623	+ 1·298	+ ·188
90	·7200	5·436	+ 1·275	+ ·181
90	·7580	5·407	+ ·880	+ ·050
90	·8022	4·728	+ ·338	— ·128
90	·8452	4·206	— ·101	— ·273
90	·8799	3·487	— ·856	— ·522
90	·9103	3·176	— 1·363	— ·690
90	·9489	2·713	— 1·603	— ·769
90	·9845	2·574	— 1·666	— ·790

From SCHMIDT's observations alone I derive a period of $7^d·01202 \pm {}^d·00011$ (m.e.).

2. A series of 923 estimates made by Mrs. ROBINSON on Harvard plates taken between J.D. 2414757 and 2425877 was published in detail by SHAPLEY (*Proc. of the American Acad. of Art and Sciences*, Vol. 64, No. 11; 1930, *Harvard Reprint* 67). The phases of these observations were computed anew according to the formula: phase = $^{d-1}·14261$ (J.D. — 2400000), the same as used above. Mean values of phase and magnitude are given in Table 4 for 23 groups of about 40 estimates each and graphed in Figure 2. They show a variation between $4^m·96$ and $5^m·84$ or a range of $^m·88$.

FIGURE 1.



2250 estimates by J. F. J. SCHMIDT
upper diagram: original estimates, *s*.
lower diagram: estimates reduced to mean scale, *s'*.

From this material I derived by least squares the period of X Sgr in the 4 independent and different ways indicated in Table 5. The period used for determining the limiting phases, adopted in Table 5, should, of course, be approximately correct.

The period given by SHAPLEY (l.c.) as derived from the same observations is $7^d·011154 \pm {}^d·000071$ (m.e.).

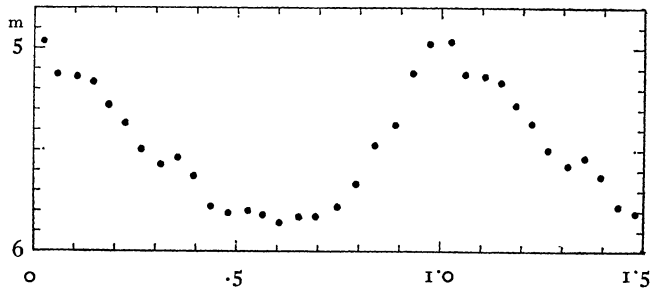
TABLE 4.

923 estimates by Mrs. ROBINSON.

n	phase	m_{pg}	red to VOÛTE's scale
	P	m	m
40	·0224	4·970	— ·938
40	·0588	5·129	— ·739
40	·1054	5·142	— ·722
40	·1457	5·172	— ·685
40	·1839	5·283	— ·546
40	·2236	5·369	— ·439
40	·2641	5·501	— ·274
40	·3111	5·576	— ·180
40	·3538	5·541	— ·224
40	·3941	5·634	— ·108
40	·4373	5·778	+ ·073
40	·4804	5·811	+ ·114
40	·5268	5·795	+ ·094
40	·5642	5·821	+ ·126
40	·6041	5·860	+ ·174
40	·6507	5·830	+ ·138
40	·6939	5·832	+ ·139
40	·7464	5·784	+ ·080
40	·7912	5·670	— ·062
40	·8369	5·478	— ·303
40	·8893	5·380	— ·424
40	·9291	5·125	— ·744
43	·9711	4·983	— ·921

It deviates by 11 times its indicated mean error from the result found in Table 5. SHAPLEY's value is not a misprint, as the phases given in Table IV of *Harvard*

FIGURE 2.



923 estimates by Mrs. ROBINSON.

Reprint 67 have been calculated with that inaccurate period, which again has been taken over by ROBINSON in a recent paper in *Harv. Ann.* Vol. 90, No. 2, where a new mean lightcurve has been derived, using other magnitudes for the comparison stars. A variation between $4^m{\cdot}40$ and $5^m{\cdot}74$ with a range of $1^m{\cdot}34$ is thus shown.

TABLE 5.

Estimates by Mrs. ROBINSON.

	limits of magnitude or phase	number of estimates	m.e. of single epoch	period	m.e.
			d	d	d
maximum	$m < 5{\cdot}0$	76	± ·63	7·01175	± ·00019
minimum	$m > 5{\cdot}9$	174	± 1·00	7·01202	± ·00022
rising branch [1]	·80<P<·95	132	± ·47	7·01173	± ·00012
descending branch [1]	·05<P<·45	375	± ·94	7·01229	± ·00012
		weighted mean:		7·01196	± ·00007.

[1] The individual dates have been reduced to $m = 5{\cdot}4$ by adding (m—5·4) 1·7 d/m to those falling on the rising and (5·4—m) 4·0 d/m to those falling on the descending branch of the lightcurve.

3. The phases of the 182 photographic observations of X Sgr made mainly by VOÛTE and WITLOX, (*Ann. v. d. Bosscha Sterrenwacht* Vol. 2, p. B 21) have been calculated again by the formula:

$$\text{phase} = {}^{d-1}{\cdot}14261\ (\text{J.D.} - 2400000).$$

Mean results of groups of from 8 to 10 observations each are given in Table 6 and graphed in Figure 3. The star varies from $-^m{\cdot}94$ to $+^m{\cdot}24$, the range thus being $1^m{\cdot}18$.

The mean results derived from the estimates of SCHMIDT, *s'*, and Mrs. ROBINSON, R, have been reduced to VOÛTE's scale, V, by means of the formulae:

$$V = {\cdot}33\,s' - {\cdot}24 \quad \text{and} \quad V = 1{\cdot}25\,R - 7{\cdot}15$$

The resulting values are given in the last columns of Tables 3 and 4. The weights of the three series are derived as follows:

	number of obs.	m.e. of single obs. in the scale of VOÛTE	total weight
		m	m^{-2}
SCHMIDT	2250	± ·195	59000
Mrs. ROBINSON	923	± ·294	10700
VOÛTE, WITLOX	182	± ·068	39000

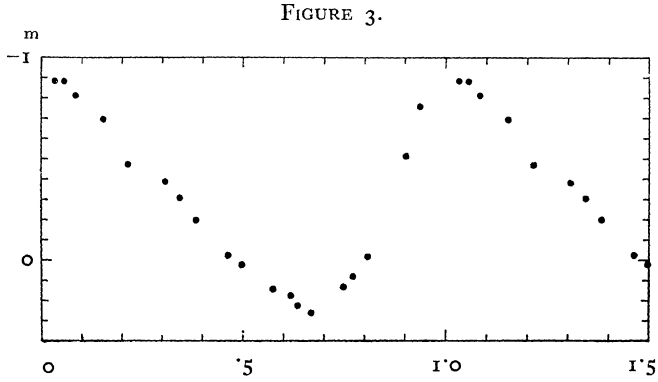
TABLE 6.

182 observations by VOÛTE and WITLOX.

n	phase	m_{pg}
	P	m
10	·0333	— ·882
10	·0551	— ·880
10	·0835	— ·808
10	·1513	— ·693
10	·2149	— ·469
10	·3060	— ·384
10	·3427	— ·304
10	·3838	— ·198
10	·4638	— ·022
10	·4971	+ ·022
10	·5741	+ ·146
10	·6181	+ ·179
10	·6326	+ ·226
10	·6679	+ ·262
8	·7475	+ ·135
8	·7705	+ ·082
8	·8072	— ·015
9	·9007	— ·517
9	·9361	— ·756

In this connection it should be remembered that SCHMIDT's observations are visual, in which case the range is smaller than photographically and that the plates used by Mrs. ROBINSON are vastly overexposed for a star as bright as X Sgr.

FIGURE 3.



182 measures by VOÛTE and WITLOX.

4. After having been reduced to the scale of VOÛTE the lightcurves of SCHMIDT and of Mrs. ROBINSON were shifted relative to that of VOÛTE and WITLOX until