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ORBIT OF THE SPECTROSCOPIC BINARY 2 SAGITTÆ

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The binary character of 2 Sagittæ ($\alpha = 19^h\ 20^m$, $\delta = +16°\ 46'$, type A3, mag. 6·2) was announced by Adams in the *Astrophysical Journal*, Vol. 35, page 177. Other designations for 2 Sagittæ are Boss 4947 and H.R.P. 7369. Forty-four spectrograms secured at this observatory, with a one-prism spectrograph, have been used in determining an orbit.

Shortly after the star was placed on the observing programme, it was discovered that both spectra were present. The widest separation between the components is somewhat over one hundred kilometres. These conditions make it difficult to determine accurate elements with the low dispersion used. However, the secondary spectrum is so much fainter than the primary, that the measures of blends, where such occur, tend to follow the primary curve. The elements may probably be regarded therefore as a first approximation. Better elements could be obtained with higher dispersion, for the lines when not confused by the secondary spectrum are fairly sharp and narrow.

Table I gives the data necessary for correcting the wave-lengths used in making the reductions. The residuals are taken in the sense, observed minus the mean of the plate. Several other lines besides those given in the table were occasionally measured.

The journal of observations taken at Mount Wilson and Ottawa follows in Tables II and III. Phases are counted from Julian Day 2,420,940·0. The residuals given in the eighth column are taken from the final curve, and should be accurate to the nearest kilometre. Those marked with an asterisk, result from plates which lie on that part of the orbit where the two sets of lines are not clearly separated and the velocity is the measure of the blend. Such measures were kept separate in forming the normal places, and in selecting preliminary elements allowance was made for the tendency of the measures of such blends to lie off the primary curve and toward the γ-axis.

TABLE I

Wave-Length	Element	Arithmetic Residual	Algebraic Residual	Number of times measured	Wave-Length	Element	Arithmetic Residual	Algebraic Residual	Number of times measured
4005·414	*Fe*	6·8	+ 0·6	6	4271·675	*Fe*	5·2	+ 0·9	11
4045·940	*Fe*	4·7	− 1·2	18	4307·974	*Fe*	3·4	+ 0·6	5
4063·730	*Fe*	5·7	+ 0·3	11	4351·977	*Cr–Mg*	6·2	− 0·6	7
4143·839	*Fe*	8·4	+ 0·9	8	4481·477	*Mg*	5·0	− 0·5	31
4215·733	*Fe*	5·1	− 0·6	9	4534·158	*Ti*	2·8	+ 2·4	8
4233·425	*Mg–Fe*	4·6	+ 2·8	11	4549·743	*Fe*	5·8	− 1·0	31

TABLE II

MOUNT WILSON OBSERVATIONS OF 2 SAGITTÆ

Date	Julian Day	Phase	Velocity	O–C
1911				
August 9	2,419,258·765	3·685	+ 61	− 5
October 31	341·657	5·287	+ 18	− 6

TABLE III

OTTAWA OBSERVATIONS OF 2 SAGITTÆ

Plate	Observer*	Date	Julian Day	Phase	Velocity	Weight	O–C	Velocity Secondary
		1916						
7575	Y	Mar. 23	2,420,946·892	6·892	−26·8	1	+ 7*	....
7577	Y	Mar. 25	948·888	1·498	− 0·3	1	+11*	....
7591	H	Mar. 30	953·892	6·502	−14·2	½	+ 9*	....
7597	H	April 2	956·894	2·104	+11·3	1	− 4	....
7605	Y	April 5	959·890	5·110	+31·0	1	0	....
7612	Y	April 14	968·847	6·677	−24·5	1	+ 4	....
7619	C	April 19	973·809	4·249	....	....	....	....
7631	H	May 2	986·838	2·498	+22·6	½	−11*	....
7636	Y	May 4	988·788	4·448	+54·8	1	− 1	....
7639	H	May 7	991·778	0·048	−35·5	½	+ 3	....
7647	H	May 9	993·787	2·057	+16·7	1	+ 2	....
7650	Y	May 13	997·802	6·072	+ 0·6	1	+10*	....
7666	Y	May 24	2,421,008·788	2·278	+11·1	1	−12*	....
7669	Y	May 25	009·786	3·276	+55·4	1	− 6	....
7672	H	May 26	010·777	4·267	+67·9	½	+ 7	−43·9
7675	H	May 28	012·762	6·252	....	....	....	....
7680	C	May 31	015·767	1·867	+ 4·8	1	0	....
7685	Y	June 1	016·820	2·920	+55·1	1	+ 5	−46·7
7692	H–Y	June 6	021·731	0·441	−31·5	1	+ 7	+86·6
7695	Y	June 13	028·670	7·380	−43·0	1	− 4	+93·9
7699	Y	June 17	032·816	4·136	+55·2	1	− 8	−63·8
7700	Y	June 20	035·705	7·025	−40·9	1	− 5	+78·1
7704	C	June 23	038·781	2·711	+35·6	½	− 8*	....
7706	Y	June 25	040·684	4·614	+45·3	1	− 6	−64·6
7710	Y	June 29	044·667	1·207	− 9·2	½	+13*	....
7714	C	June 30	045·647	2·187	....	....	....	....
7715	Y	July 4	049·816	6·356	− 4·0	½	+15*	....
7717	Y	July 5	050·691	7·231	−35·7	½	+ 2	+70·2
7724	Y	July 9	054·603	3·753	+71·4	1	+ 5	−63·6
7725	Y	July 9	054·687	3·837	+59·0	1	− 7	−72·3
7731	Y	July 13	058·747	0·507	−41·0	½	− 4	....
7738	Y	July 17	062·639	4·399	+68·4	1	+11	−64·7
7743	Y	July 19	064·601	6·351	−16·8	½	+ 2	....
7753	Y	July 23	068·625	2·995	+50·2	1	− 3	−66·9
7755	Y	July 24	069·595	3·965	+67·8	1	+ 3	−70·5
7767	Y	Aug. 1	077·603	4·588	+59·1	1	+ 8	−58·3
7771	Y	Aug. 2	078·590	5·575	+12·6	1	+ 1	....
7775	Y	Aug. 10	086·771	6·366	+ 8·0	0	....	....
7779	Y	Aug. 14	090·566	2·766	+38·6	1	− 9*	−45·7
7803	Y	Sept. 8	115·544	5·574	+ 9·0	1	− 2	....
7808	Y	Sept. 10	117·552	0·192	−33·4	1	+ 6	+94·8
7815	Y	Sept. 24	131·611	6·861	−37·6	½	− 5	....
7816	Y	Sept. 25	132·521	0·381	−48·6	1	− 9	+79·6
7829	Y	Oct. 1	138·589	6·449	−21·4	½	0	....
7842	Y	Oct. 3	140·513	0·983	−34·0	1	− 6	+85·8
7868	Y	Oct. 10	147·529	0·609	−42·2	1	− 6	....
7908	Y	Nov. 21	189·455	5·585	+ 7·4	1	− 4	....
7947	Y	Dec. 17	215·453	2·023	+21·5	1	+10	....

* H = Harper; C = Cannon; Y = Young.

MEASURES OF 2 SAGITTÆ

λ	7575*		7577*		7597		7605		7612		7636		7647	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4005·414					− 14·6	½								
4045·940			− 3·3	½	− 11·4	½			− 44·6	½	+ 35·1	½	− 5·1	½
4063·730							+ 11·7	½					+ 0·9	½
4071·865			− 27·9	½					− 45·1	½			− 1·5	½
4128·214			− 20·6	½										
4143·839			− 7·8	½					− 63·5	½				
4215·733							+ 2·7	½						
4233·425	− 59·5	½	− 38·7	½			− 1·3	½	− 34·9	½			+ 0·8	½
4250·586													− 0·3	½
4271·675			− 21·8	½	− 1·4	½	+ 10·1	½					− 0·3	½
4290·053											+ 35·7	¼		
4307·974							+ 13·0	½			+ 29·9	½		
4340·645	− 38·6	½							− 50·8	½				
4351·977							− 1·8	½					− 3·5	½
4443·976	− 41·2	½									+ 22·2	½		
4481·477	− 48·4	1	− 25·9	1	− 16·5	1	+ 12·9	½	− 48·3	1	+ 41·0	1	− 7·1	1
4515·508					− 11·0	½							− 9·7	½
4534·158	− 56·2	½			− 3·6	½			− 45·7	½				
4549·743	− 45·7	½	− 26·0	½	− 15·5	½	+ 13·3	1	− 36·7	½	+ 30·4	1	− 9·6	1
4558·827			− 22·8	½										
4572·190									− 61·8	½				
4584·018									− 44·4	½				
Weighted mean	− 48·28		− 22·07		− 11·31		+ 8·21		− 47·65		+ 33·05		− 4·34	
V_a	+ 21·58		+ 21·87		+ 22·73		+ 22·94		+ 23·21		+ 21·87		+ 21·14	
V_d	+ 0·21		+ 0·21		+ 0·16		+ 0·15		+ 0·18		+ 0·20		+ 0·17	
Curv.	− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28	
Radial Velocity	− 26·8		− 0·3		+ 11·3		+ 31·0		− 24·5		+ 54·8		+ 16·7	

MEASURES OF 2 SAGITTÆ—*Continued*

λ	7650*		7666*		7669		7680		7685		7692		7695	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4005·414			− 5·9	½	+ 40·5	¼			+ 46·0	½	− 36·5	½	− 51·4	1
4045·940	− 15·3	½			+ 37·3	¼			+ 31·6	½				
4063·730	− 28·4	½			+ 42·1	¼			+ 49·2	½	− 51·2	½		
4071·865							− 16·0	½						
4128·214	− 21·4	½												
4143·839											− 44·8	½	− 58·4	1
4202·366													− 53·8	1
4215·733	− 21·4	½											− 51·4	1
4233·425			− 6·8	½	+ 39·2	½	− 10·0	½						
4250·586			− 16·0	½										
4271·675					+ 39·1	½							− 58·1	1
4300·211	− 19·1	½												
4307·974					+ 42·2	½	− 9·4	½	+ 41·1	½	− 54·5	½		
4351·977	− 7·4	½	− 10·3	½	+ 29·0	¼							− 59·7	1
4395·155							− 1·3	½						
4443·976	− 11·9	½												
4481·477	− 17·1	1	− 5·6	1	+ 30·5	1	− 19·4	1	+ 34·2	1	− 38·7	1	− 61·7	2
4534·158	− 19·7	½							+ 37·8	½				
4549·743	− 30·4	1	− 2·0	1	+ 41·8	1	− 6·8	1	+ 41·3	½	− 56·1	½	− 47·5	2
4572·190	− 16·0	½					− 10·4	½						
Weighted mean	− 19·66		− 6·77		+ 37·73		− 11·06		+ 39·43		− 45·79		− 55·12	
V_a	+ 20·41		+ 18·07		+ 17·82		+ 16·14		+ 15·95		+ 14·39		+ 12·21	
V_d	+ 0·12		+ 0·09		+ 0·09		± 0·00		± 0·00		+ 0·14		+ 0·15	
Curv.	− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28	
Radial Velocity	+ 0·6		+ 11·1		+ 55·4		+ 4·8		+ 55·1		− 31·5		− 43·0	

MEASURES OF 2 SAGITTÆ—*Continued*

λ	7699		7700		7704*		7706		7710*		7724		7725	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4045·940	+ 41·3	½	− 44·8	¼			+ 40·4	¼	− 20·1	½	+ 69·5	½	+ 55·8	½
4063·730			− 58·7	¼			+ 25·0	¼	− 30·6	½				
4143·839							+ 34·0	¼						
4215·733	+ 47·6	½												
4233·425			− 45·1	¼										
4236·000											+ 70·3	½		
4250·586					+ 20·2	¼			− 3·4	½				
4260·537			− 46·2	¼										
4271·675			− 56·0	¼							+ 65·5	½		
4290·053													+ 55·5	½
4307·974	+ 45·0	½	− 56·6	¼										
4315·178											+ 60·0	½	+ 50·6	½
4340·645					+ 25·9	¼	+ 28·2	¼						
4481·477	+ 54·2	1	− 49·3	1	+ 31·7	½	+ 44·2	½	− 13·8	1	+ 74·1	1	+ 61·0	1
4549·743	+ 26·2	½			+ 25·6	½	+ 41·8	½	− 12·3	½	+ 67·4	1	+ 54·3	½
Weighted mean	+ 44·75		− 50·46		+ 26·78		+ 37·45		− 15·67		+ 68·54		+ 56·36	
V_a	+ 10·84		+ 9·85		+ 9·12		+ 8·04		+ 6·63		+ 2·92		+ 2·88	
V_d	− 0·07		± 0·00		− 0·04		+ 0·12		+ 0·15		+ 0·18		+ 0·09	
Curv.	− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28	
Radial Velocity	+ 55·2		− 40·9		+ 35·6		+ 45·3		− 9·2		+ 71·4		+ 59·0	

MEASURES OF 2 SAGITTÆ—*Continued*

λ	7738		7743		7753		7755		7767		7771		7775	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4005·414											+ 3·9	½		
4045·940			− 18·3	½	+ 66·0	½			+ 61·1	½	+ 1·1	½		
4063·730	+ 72·6	½			+ 54·6	½	+ 80·6	½	+ 56·4	½				
4071·865									+ 63·6	½				
4143·839					+ 59·5	½	+ 62·4	½			+ 30·2	½		
4202·366			− 19·5	½										
4215·733	+ 74·1	½					+ 72·1	½	+ 72·1	½				
4233·425									+ 71·9	½	+ 19·1	½		
4236·000			− 9·2	½										
4260·537											+ 22·0	½		
4271·675									+ 75·4	½	+ 10·8	½	+ 24·1	¼
4290·053											+ 22·4	½		
4307·974													+ 18·0	¼
4315·178									+ 74·8	½				
4351·977							+ 85·2	½					+ 22·1	¼
4481·477	+ 59·8	½	− 15·7	1	+ 46·7	1	+ 61·7	1	+ 54·3	1	+ 19·3	1	+ 23·0	1
4501·417											+ 21·3	½		
4515·508											+ 27·9	½		
4534·158									+ 66·9	½	+ 20·4	½		
4549·743	+ 68·6	½			+ 43·9	½	+ 71·3	1	+ 66·1	1	+ 17·7	½	+ 2·1	½
4572·190											+ 33·3	½		
Weighted mean	+ 68·77		− 15·68		+ 52·90		+ 70·79		+ 65·25		+ 19·12		+ 17·82	
V_a	− 0·12		− 0·94		− 2·50		− 2·88		− 5·94		− 6·31		− 9·31	
V_d	+ 0·02		+ 0·14		+ 0·10		+ 0·15		+ 0·10		+ 0·12		− 0·22	
Curv.	− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28	
Radial Velocity	+ 68·4		− 16·8		+ 50·2		+ 67·8		+ 59·1		+ 12·6		+ 8·0	

MEASURES OF 2 SAGITTÆ—*Continued*

λ	7779*		7803		7808		7868		7815		7816		7829	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4045·940					− 28·9	½	− 19·0	½			− 22·7	½		
4063·730	+ 56·0	½									− 10·0	½		
4071·865	+ 56·1	½												
4143·839					− 17·0	½	− 7·3	½						
4215·733											− 32·0	½		
4233·425			+ 29·0	½										
4236·000			+ 17·3	½										
4250·586	+ 40·7	½												
4260·537					− 20·8	½								
4271·675					− 18·6	½								
4290·053					− 20·9	½					− 22·5	½		
4307·974			+ 30·1	½										
4325·698							− 22·4	½						
4340·645							− 35·9	½						
4351·977	+ 43·7	½					− 19·3	½						
4395·155	+ 42·1	½												
4481·477	+ 55·4	1	+ 30·5	½	− 9·4	1	− 16·9	½	− 16·8	1	− 27·5	½	− 7·5	1
4534·158			+ 33·5	½										
4549·743	+ 47·8	1	+ 23·1	½	0·0	1	− 9·7	½	− 13·7	½	− 35·9	1	+ 10·5	1
4584·018					− 20·7	½								
Weighted mean	+ 49·44		+ 27·25		− 14·57		− 18·64		− 15·73		− 26·50		+ 1·50	
V_a	− 10·65		− 18·01		− 18·71		− 23·19		− 21·49		− 21·83		− 22·44	
V_d	+ 0·10		+ 0·02		− 0·03		− 0·12		− 0·18		− 0·02		− 0·18	
Curv.	− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28		− 0·28	
Radial Velocity	+ 38·6		+ 9·0		− 33·4		− 42·2		− 37·6		− 48·6		− 21·4	

MEASURES OF 2 SAGITTÆ—*Concluded*

λ	7842		7908		7947									
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
4143·839	− 19·4	½												
4215·733	− 13·6	½	+ 14·5	½										
4233·425	− 8·9	½	+ 31·3	½										
4260·537	− 3·8	½												
4307·974			+ 31·3	½										
4340·645	− 17·4	½												
4395·155			+ 31·7	½										
4481·477	− 13·2	½	+ 30·5	½	+ 36·9	½								
4534·158			+ 28·9	½										
4549·743	− 4·5	½	+ 21·8	½	+ 30·2	½								
4584·018	− 8·7	½												
Weighted mean	− 11·18		+ 27·14		+ 33·55									
V_a	− 22·65		− 19·31		− 11·46									
V_d	− 0·07		− 0·18		− 0·28									
Curv.	− 0·28		− 0·28		− 0·28									
Radial Velocity	− 34·0		+ 7·4		+ 21·5									

The writer has found the following method of getting preliminary elements very satisfactory. With the aid of a complete set of "protractors", which the observatory possesses for the simplification of King's graphical method, curves were drawn on tracing linen, representing all orbits from eccentricity 0·0 to 0·7 and $\omega=0°$ to $\omega=360°$. The interval for the eccentricity is 0·05, save for the large values which are seldom used. The interval for ω is fifteen degrees. It might seem labourious to draw all these curves, but one curve will do for four values of ω by inverting the sheet or looking through the linen from the back, so that the labour is not so great as it appears at first sight. The construction of a complete set of curves occupies about ten hours, if the protractors are already at hand. The calculations need be made but once. In selecting a set of elements, the normal places are plotted on the scale of these curves. This supposes that we know the amplitude of the curve. Although this is unknown, it is the most easily determined of all the elements and can usually be selected with sufficient accuracy at the first trial. The curves are now fitted in turn over the normal places till the one most satisfactory is found. If two or more curves seem to give equally good representations, it is quite possible to interpolate elements between the graphs plotted, and so obtain a result with the eccentricity within one or two hundredths and ω within a few degrees.

In the present case a wide range of values of ω will satisfy the normal places about equally well. These values center about $\omega=330°$ and $e=0·05$. The uncertainty in the value of ω is partly dependent on the fact that the observations where the spectra are just separating can not be given much weight. In the least-square solution, recorded below, they were omitted, and to make the solution determinate periastron passage was fixed.

NORMAL PLACES

	Julian Day	Phase from J. D. 2,420,940·0	Velocity	Weight	O–C Preliminary	O–C Final
1	2,420,940·041	0·041	−37·3	1·0	+ 2·22	+ 2·09
2	940·481	0·481	−41·1	1·0	− 2·27	− 3·25
3	941·058	1·058	−25·7	0·5	+ 2·69	+ 0·77
4	941·971	1·971	+10·8	1·5	+ 3·95	+ 1·15
5	942·685	2·685	+33·8	...	− 6·16	− 8·57
6	943·064	3·064	+53·6	1·0	− 0·52	− 2·32
7	943·852	3·852	+66·0	1·0	+ 0·11	− 0·04
8	944·267	4·267	+63·0	0·8	+ 1·93	+ 2·70
9	944·550	4·550	+53·1	1·0	− 0·82	+ 0·46
10	945·110	5·110	+31·0	0·3	− 2·58	− 0·67
11	945·578	5·578	+ 9·7	1·0	− 3·94	− 1·80
12	946·300	6·300	− 9·2	...	+ 5·89	+ 7·68
13	946·864	6·864	−31·7	1·0	− 0·18	+ 0·70

PRELIMINARY ELEMENTS

$P = 7 \cdot 390$ days
$T =$ Julian Day $2{,}420{,}943 \cdot 233$
$K = 53 \cdot 0$ km.
$\omega = 330°$
$e = 0 \cdot 05$
$\gamma = +10 \cdot 70$ km.
$\mu = 48° \cdot 7145$

OBSERVATION EQUATIONS

	x	y	z	p	q	−n	Weight
1	1	− 0·948	+ 0·966	− 0·110	+ 0·123	− 2·22	1·0
2	1	− 0·935	+ 0·593	+ 0·233	− 0·193	+ 2·27	1·0
3	1	− 0·738	− 0·289	+ 0·649	− 0·602	− 2·69	0·5
4	1	− 0·073	− 0·980	+ 1·018	− 1·033	− 3·95	1·5
6	1	+ 0·819	+ 0·661	+ 0·656	− 0·694	+ 0·52	1·0
7	1	+ 1·041	+ 0·803	− 0·031	+ 0·061	− 0·11	1·0
8	1	+ 0·950	+ 0·162	− 0·397	+ 0·447	− 1·93	0·8
9	1	+ 0·815	− 0·339	− 0·611	+ 0·659	+ 0·82	1·0
10	1	+ 0·431	− 0·962	− 0·897	+ 0·911	+ 2·58	0·3
11	1	+ 0·055	− 0·861	− 0·975	+ 0·953	+ 3·94	1·0
13	1	− 0·797	+ 0·813	− 0·517	+ 0·489	+ 0·18	1·0

Where $x = d\gamma$
$y = dK$
$z = Kde$
$p = Kd\omega$
$$q = \frac{K\mu}{(1-e^2)^{\frac{3}{2}}}\, dT$$

NORMAL EQUATIONS

$$10 \cdot 100x + 0 \cdot 461y + 0 \cdot 863z - 0 \cdot 089p - 2 \cdot 640 = 0$$
$$+ 5 \cdot 888y - 0 \cdot 851z - 0 \cdot 517p + 1 \cdot 326 = 0$$
$$+ 5 \cdot 666z - 0 \cdot 321p + 1 \cdot 129 = 0$$
$$+ 4 \cdot 218p - 10 \cdot 306 = 0$$

$$\begin{aligned} \text{whence, } dx &= +0\cdot295 \quad \text{or} \quad & d\gamma &= +0\cdot29 \text{ km.} \\ dy &= -0\cdot051 & dK &= -0\cdot05 \text{ km.} \\ dz &= -0\cdot114 & de &= 0\cdot00 \\ dp &= +2\cdot435 & \delta\omega &= +2^\circ\cdot63 \end{aligned}$$

FINAL ELEMENTS

$P = 7\cdot390$ days

$T =$ Julian Day 2,420,943·233

$\omega = 332^\circ\cdot6$

$e = 0\cdot05$

$K = 52\cdot95$ km.

$\gamma = +11\cdot0$ km.

$a \sin i = 5{,}370{,}000$ km.

$$\frac{m_1^3 \sin^3 i}{(m+m_1)^2} = 0\cdot11 \odot$$

Russell's short graphical method was tried after the foregoing solution was completed. This method agrees with the first in establishing the presence of eccentricity. The "anomaly" diagram, however, does not yield a smooth curve, and the position of periastron and ω remain somewhat uncertain.

The measures of the secondary spectrum are not of sufficient value to help in determining the elements of the primary. They were formed into two normal places as follows:—

Phase	Velocity	Weight	O–C
0·21	+84·1 km.	7	+ 2·7
3·84	−64·0 km.	11	+ 5·7

From these we obtain the following additional elements:—

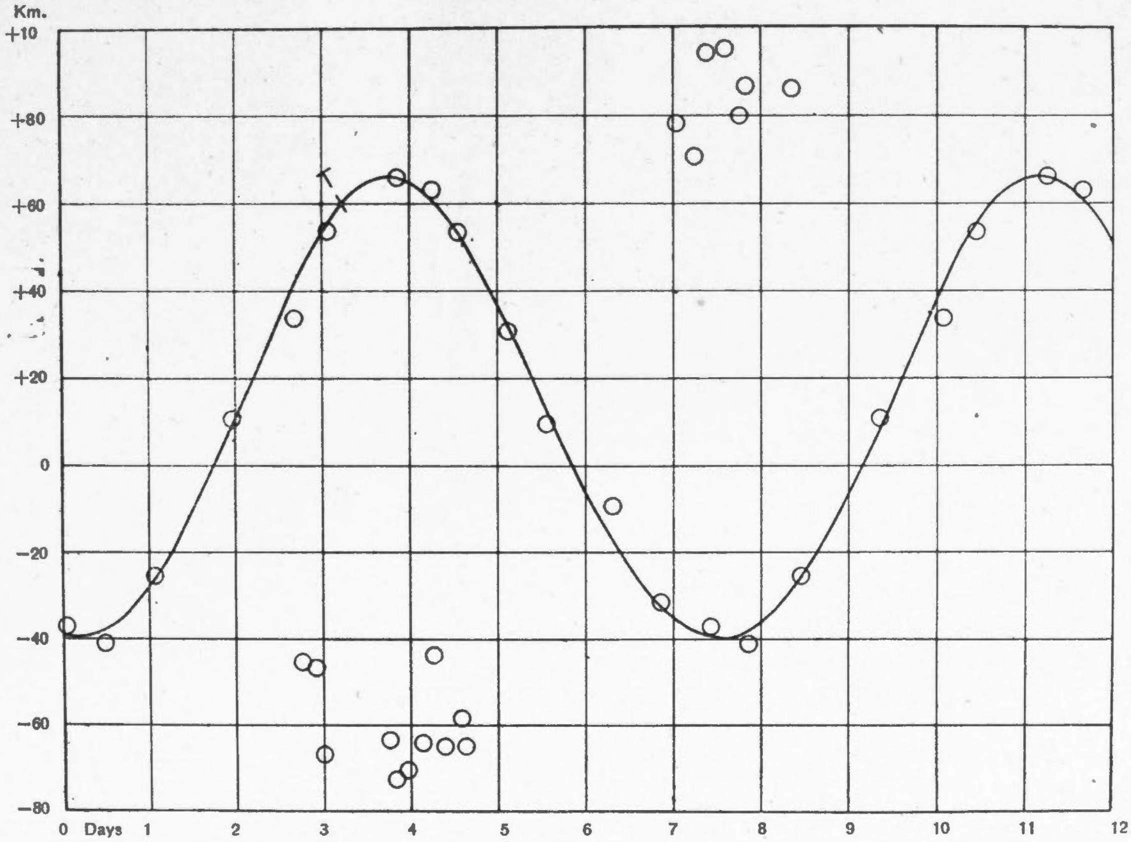
$K_1 = 73\cdot8$ km.

$a_1 \sin i = 7{,}490{,}000$ km.

$m_1 \sin^3 i = 0\cdot65 \odot$

$m \sin^3 i = 0\cdot91 \odot$

Dominion Observatory
Ottawa, January, 1917.



Radial Velocity Curve of 2 Sagittæ

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