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NEW ELEMENTS OF V694 AQUILAE

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V694 Aql = 92.1940 Aql = GSC 1058.32 was discovered by Hoffmeister (1940) on photographic plates of the Sonneberg Observatory. He classified the star as an Algol-type variable in the range between $12\overset{m}{.}0$ and $12\overset{m}{.}5$.

First investigation of this variable was performed by Rohlfs (1949). She published 25 minima (times for plates with weak images), a photographic normal light-curve and first elements:

$$\text{Min I} = \text{HJD} \quad 2428782.334 + 0\overset{d}{.}450175 \times \text{E} \tag{1}$$

The range of brightness is given as $12\overset{m}{.}4$ - $12\overset{m}{.}9$ (phot.). From her measurements she derived a time of constant light in the minimum of $1\overset{h}{.}4$. With these data V694 Aql is listed in the fourth edition of the GCVS (Kholopov et al. 1985).

Popper (1956) and Wood (1963) pointed out that V694 Aql is of special interest because of its, for an Algol type variable, extreme short period of $0\overset{d}{.}45$. Popper gives for the primary component a radius of $0.3R_{\odot}$, spectral class F0 and the radial velocities from two spectrograms. Based on the period given by Rohlfs, Brancewicz and Dworak (1980) published additional geometrical and physical parameters.

Almost 50 years later we put V694 Aql on our observing program. The CCD observations were made with SBIG ST6 cameras without filters, attached to a 32cm RC telescope with f = 1740 mm (WM), a 20cm SC telescope with f= 1200 mm (WK) and a 10cm Aero-Ektar astrograph with f = 600 mm (PF). The integration times were 60 seconds at the RC/SC–telescopes and 90 seconds at the astrograph. Our CCD observations cover 3 years. GSC 1058.1442 served as the comparison star and several other stars in the same field were used to check its constancy. In our instrumental system (Aero Ektar) the amplitude of variability is $0\overset{m}{.}50$ for the primary minima and $0\overset{m}{.}15$ for the secondary minima. A constant phase in minimum light could not be detected. All our CCD measured times of minimum light were calculated with the Kwee and van Woerden (1956) method. A thorough study of our measurements showed that the period given in the GCVS is a spurious one with the relation:

$$\frac{1}{\text{P}_{\text{GCVS}}} - \frac{1}{\text{P}} = \frac{1}{1\text{d}_{\text{sid}}} \tag{2}$$

Using only CCD measured minima a weighted least squares fit led to the new ephemeris:

$$\begin{array}{lcccc} \text{Min I} = \text{HJD} & 2450281.5621 & + & 0\overset{d}{.}8205762 & \times \text{E} \\ & \pm 2 & & \pm 5 & \end{array} \tag{3}$$

One of us (WM) investigated the variable on about 300 photographic plates of the 0.4m astrographs of the Sonneberg Observatory. 12 additional times of minimum light of V694 Aql could be found. The plates taken between JD 2442000 and JD 2448000 were of first quality. The scatter of the results is therefore small. The gap between JD 2432000 and JD 2442000 could not be closed due to a lack of useful plates from that time. Using all available minima a weighted least squares fit led to the new ephemeris:

$$\begin{array}{lllll} \text{Min I} = \text{HJD} & 2450281.563 & + & 0\overset{\text{d}}{.}8205795 & \times \text{E} \\ & \pm 4 & & \pm 4 & \end{array} \qquad (4)$$

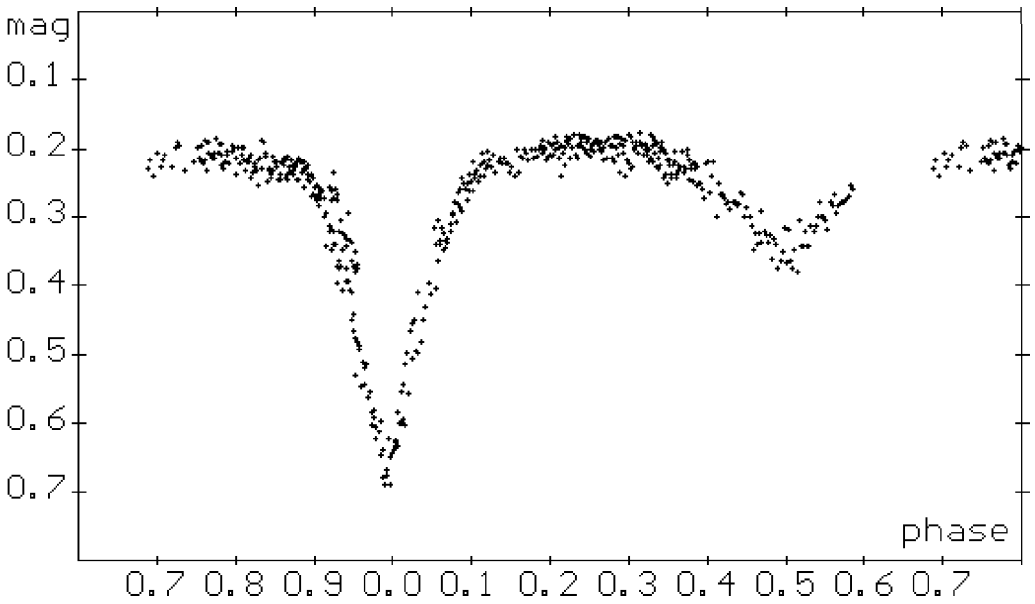

Figure 1. Differential light curve of V694 Aql (Aero-Ektar 100/610 mm) drawn with the new ephemeris (??)

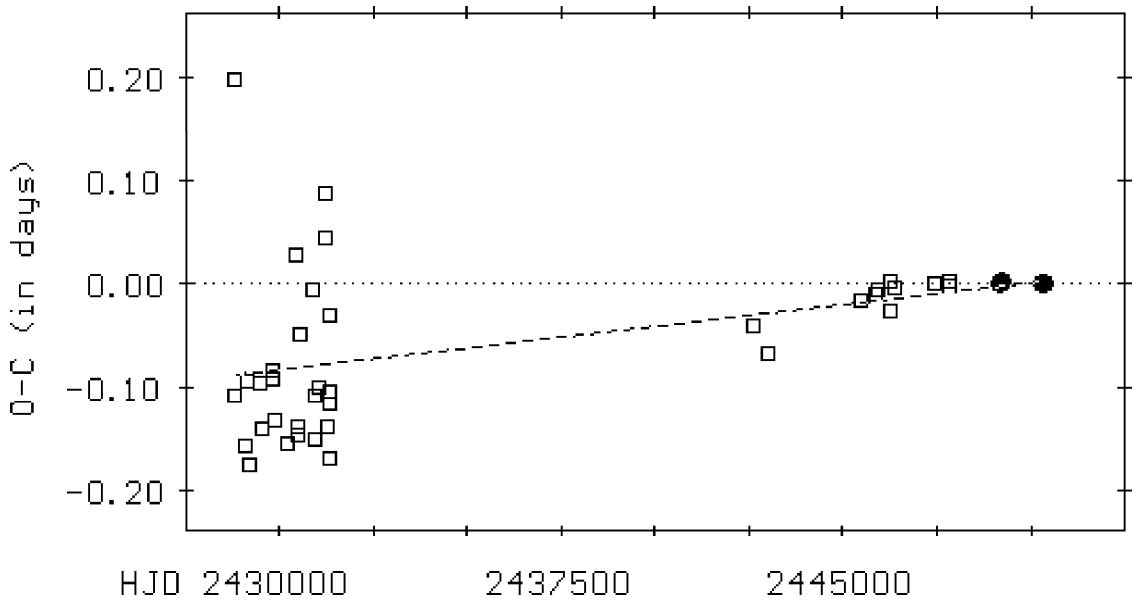

Figure 2 O−C diagram for V694 Aql using the new ephemeris (??) (dots) and the ephemeris (??) (dashes). • represent CCD measured minima and □ minima on photographic plates

Table 1. Observed times of minima for V694 Aql, epochs and residuals computed with respect to the linear ephemeris (??) derived in this paper.

JD hel. 2400000+	W	T*	Epoch	O−C	Lit	JD hel. 2400000+	W	T*	Epoch	O−C	Lit
28782.357	1	P	−26200.0	−0.109	[1]	31352.341	1	P	−23068.0	−0.169	[1]
28809.332	1	P	−26168.5	+0.198	[1]	42630.469	1	P	−9324.0	−0.041	[2]
29106.436	1	P	−25805.0	−0.157	[1]	43019.394	1	P	−8850.0	−0.069	[2]
29111.422	1	P	−25799.0	−0.095	[1]	45493.483	1	P	−5835.0	−0.017	[2]
29166.320	1	P	−25732.0	−0.175	[1]	45854.543	1	P	−5395.0	−0.011	[2]
29463.448	1	P	−25370.0	−0.096	[1]	45905.423	1	P	−5333.0	−0.006	[2]
29546.281	1	P	−25269.0	−0.141	[1]	46271.407	1	P	−4887.0	+0.001	[2]
29783.476	1	P	−24980.0	−0.093	[1]	46289.432	1	P	−4865.0	−0.027	[2]
29824.513	1	P	−24930.0	−0.084	[1]	46354.279	1	P	−4786.0	−0.005	[2]
29879.443	1	P	−24863.0	−0.133	[1]	47438.265	1	P	−3465.0	−0.001	[2]
30199.445	1	P	−24473.0	−0.156	[1]	47822.297	1	P	−2997.0	+0.002	[2]
30446.623	1	P	−24172.0	+0.029	[1]	47859.218	1	P	−2952.0	−0.003	[2]
30496.510	1	P	−24111.0	−0.139	[1]	49168.4495	10	E	−1357.5	−0.0010	[2]
30547.475	1	P	−24049.0	−0.050	[1]	49250.51	5	E:	−1257.5	+0.00	[2]
30904.469	1	P	−23614.0	−0.007	[1]	50279.5170	10	E	−3.5	+0.0063	[3]
30931.445	1	P	−23581.0	−0.110	[1]	50281.5613	10	E	0.0	−0.0008	[4]
30940.430	1	P	−23570.0	−0.151	[1]	50284.4323	10	E	3.5	−0.0018	[3]
31028.283	1	P	−23463.0	−0.100	[1]	50286.4844	10	E	6.0	−0.0012	[4]
31229.510	1	P	−23218.0	+0.086	[1]	50300.4350	10	E	23.0	−0.0004	[5]
31238.495	1	P	−23207.0	+0.045	[1]	50314.3843	10	E	40.0	−0.0008	[3]
31292.468	1	P	−23141.0	−0.140	[1]	50332.4376	10	E	62.0	−0.0002	[2]
31324.506	1	P	−23102.0	−0.105	[1]	50360.3369	10	E	96.0	−0.0005	[2]
31325.400	1	P	−23101.0	−0.031	[1]	50381.2612	10	E	121.5	−0.0009	[5]
31343.366	1	P	−23079.0	−0.118	[1]	50383.3138	10	E	124.0	+0.0003	[2]

*) P denotes photographic minima and E CCD observed minima.
Those marked with ':' got reduced weight.

[1]: E. Rohlfs: VSS 1.236, [2]: W. Moschner: this paper, [3]: P. Frank: this paper, [4]: P. Frank & W. Moschner: this paper, [5]: W. Kleikamp: this paper

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