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THE PERIOD OF AG PHOENICIS HAS DECREASED

This study is based upon the photographic times of minimum from the epoch of discovery of the light variation of this system (Strohmeier, 1972) and on the photoelectric times of minimum derived by the author in two observational seasons at CTIO [1] in Chile, during 1979 and 1984 in the UBV and VRI systems, respectively (Cerruti, 1980; 1993). The 'history' of the system comprises about 10000 cycles.

The bisection-of-chords method was used for the determination of the UBV times of minima while Kwee and Van Woerden's (1956) algorithm was used with the VRI observations. Standard deviations were assigned to the photographic minima based in the displayed values of the residuals by an unweighted linear least squares fit of these minima. The dispersion used for the photoelectric minima was that of the output of the applied method.

In Table 1 are displayed the residuals (O-C) and (O-C)' from two linear least squares solutions between the three epochs of observation. The derived ephemerides are:

$$\text{Min I} = \text{HJD } 2444170^{d}.79581 + 0^{d}.75534298 \times E \quad (1)$$
$$\pm 0^{d}.0048 \pm 0^{d}.00000051 \text{ m.e.}$$

$$\text{Min I} = \text{HJD } 2444170^{d}.79505 + 0^{d}.75533906 \times E' \quad (2)$$
$$\pm 0^{d}.00013 \pm 0^{d}.00000011 \text{ m.e.}$$

Figure 1 depicts the behaviour of the residuals for the two solutions. The period decreased by $\Delta P/P = -5.2 \times 10^{-6}$ in 21 years leading to $\dot{P}/P = -2.47 \times 10^{-7}$ per year and an associated time scale of period changes of 4.0×10^{6} years.

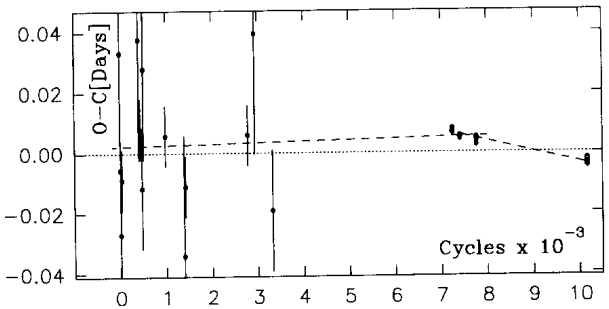

Figure 1. Behaviour of the O−C residuals for AG Phe form the ephemeris T=HJD 38309.332+0.7553426×E. Filled circles stand for primary minima.

[1] NOAO, operated by AURA Inc. under cooperative agreement with the NSF

Table 1. Times of minima and residuals for AG Phe

Ref.	Min.	Band	HJD (sigma) 2400000+	E	(O-C)	(O-C)'
1	I	pg.	38309.3650(0.0300)	-7760.0	0.0307	
1	I	pg.	38315.3690(0.0100)	-7752.0	-0.0080	
1	I	pg.	38318.3690(0.0300)	-7748.0	-0.0294	
1	I	pg.	38340.2920(0.0100)	-7719.0	-0.0113	
1	I	pg.	38614.5280(0.0400)	-7356.0	0.0352	
1	I	pg.	38642.4460(0.0100)	-7319.0	0.0055	
1	I	pg.	38670.3740(0.0200)	-7282.0	-0.0142	
1	I	pg.	38695.3400(0.0300)	-7249.0	0.0255	
1	I	pg.	39053.3500(0.0100)	-6775.0	0.0029	
1	I	pg.	39361.4900(0.0400)	-6367.0	-0.0370	
1	I	pg.	39383.4180(0.0100)	-6338.0	-0.0140	
1	I	pg.	40415.2330(0.0100)	-4972.0	0.0025	
1	I	pg.	40526.3020(0.0400)	-4825.0	0.0361	
1	I	pg.	40823.0930(0.0200)	-4432.0	-0.0227	
2	I	U	43778.7756(0.0003)	-519.0	0.0028	0.0015
2	I	B	43778.7745(0.0003)	-519.0	0.0017	0.0004
2	I	V	43778.7749(0.0004)	-519.0	0.0021	0.0008
2	I	U	43781.7956(0.0009)	-515.0	0.0014	0.0002
2	I	B	43781.7954(0.0004)	-515.0	0.0012	0.0000
2	I	V	43781.7957(0.0003)	-515.0	0.0015	0.0003
2	I	U	43902.6483(0.0010)	-355.0	-0.0008	-0.0014
2	I	B	43902.6487(0.0003)	-355.0	-0.0004	-0.0010
2	I	V	43902.6494(0.0003)	-355.0	0.0003	-0.0003
2	I	U	44170.7948(0.0003)	0.0	-0.0010	-0.0003
2	I	B	44170.7949(0.0004)	0.0	-0.0009	-0.0002
2	I	V	44170.7951(0.0008)	0.0	-0.0007	0.0000
2	I	U	44171.5501(0.0003)	1.0	-0.0011	-0.0003
2	I	B	44171.5507(0.0007)	1.0	-0.0005	0.0003
2	I	V	44171.5509(0.0003)	1.0	-0.0003	0.0005
2	I	U	44173.8144(0.0009)	4.0	-0.0028	-0.0020
2	I	B	44173.8157(0.0004)	4.0	-0.0015	-0.0007
2	I	V	44173.8161(0.0004)	4.0	-0.0011	-0.0003
2	I	U	44174.5721(0.0008)	5.0	-0.0004	0.0004
2	I	B	44174.5717(0.0003)	5.0	-0.0008	0.0000
2	I	V	44174.5715(0.0004)	5.0	-0.0010	-0.0002
3	I	V	45986.6300(0.0004)	2404.0		-0.0002
3	I	R	45986.6299(0.0006)	2404.0		-0.0003
3	I	I	45986.6297(0.0006)	2404.0		-0.0005
3	I	V	45988.8961(0.0006)	2407.0		-0.0001
3	I	R	45988.8963(0.0003)	2407.0		0.0001
3	I	I	45988.8963(0.0004)	2407.0		0.0001
3	II	V	45990.7840(0.0011)	2409.5		-0.0005
3	II	R	45990.7855(0.0011)	2409.5		0.0010
3	II	I	45990.7861(0.0009)	2409.5		0.0016

1) Strohmeier (1972);
2) 1979 minima;
3) 1984 minima.

Because the system is believed to be in an almost semidetached configuration (Cerruti, in preparation) with the less massive component near filling its Roche lobe, the interpretation of this decrease in terms of pure conservative mass transfer is prohibited by theory. For illustrative purposes the term that accounts for a monotonic decrease is $dP/dE=-(4.46 \pm 0.58)x10^{-10}$ obtained from a parabolic least squares fit to the minima. Excluding third body effects the variation might be caused by mass and angular momentum loss from the system, perhaps by stellar wind from the low mass component or by a mechanism to account for alternate period changes in the system (Tout and Hall, 1991; Hall, 1989).

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