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Updated ephemerides for the cataclysmic variable EX Hydrae

Cyclical variations in the orbital periods of close binary systems may be caused by solar-type magnetic cycles of the component stars (Warner 1988) although the mechanism is still under discussion (see Applegate 1992 and references therein). The cataclysmic variable EX Hya shows orbital period fluctuations consistent with a ~ 20 year cyclical variation (Jablonski & Busko 1985; Bond & Freeth 1988), however since observations cover only ~ 1 of these cycles continued monitoring is required. We observed EX Hya on several nights over the interval 1991 Jan 10–22, five years after the last published data. We used the 0.75-m telescope of the South African Astronomical Observatory, making 2-s integrations with the UCT photometer and an unfiltered RCA Ga As tube.

The 98-min orbital period in EX Hya is manifest as sharp, shallow eclipses which make excellent fiducial marks. We timed 13 eclipses, measuring their midpoints by fitting with a Gaussian profile (Table 1). To investigate the long term behaviour we have calculated the residuals about the linear ephemeris of Mumford (1967), corrected to barycentric dynamical time:

$$TDB_{\text{eclipse}} = 2437699.94179 + 0.068233846\ E$$

These residuals are plotted in Fig. 1 along with previously published data (from Bond & Freeth 1988 and references therein). The new timings are consistent with the suggested cyclical variation; a sinusoidal fit gives:

$$\begin{array}{cccc} O-C = & -0.00027 & +\ 0.00028 \sin[360^{\circ}(E/93500) + 7^{\circ}] \\ & \pm 3 & \pm\ 4 \qquad\qquad & \pm\ 6500 \pm 24 \end{array}$$

where the period of 93500 cycles corresponds to 17.5 ± 1.2 years.

TABLE 1: Timings (TDB - 2448200)

Eclipses	72.50212	76.59601	Spin	72.5123	75.5416
66.56632	72.57081	78.57531	67.5824	72.5635	75.5894
67.58930	73.59361		68.5629	72.6085	76.5730
68.54457	74.54889		68.6100	73.5861	76.6081
68.61324	74.61851		69.5430	74.5687	78.5623
69.56834	75.57312		69.5807	74.6096	78.6098

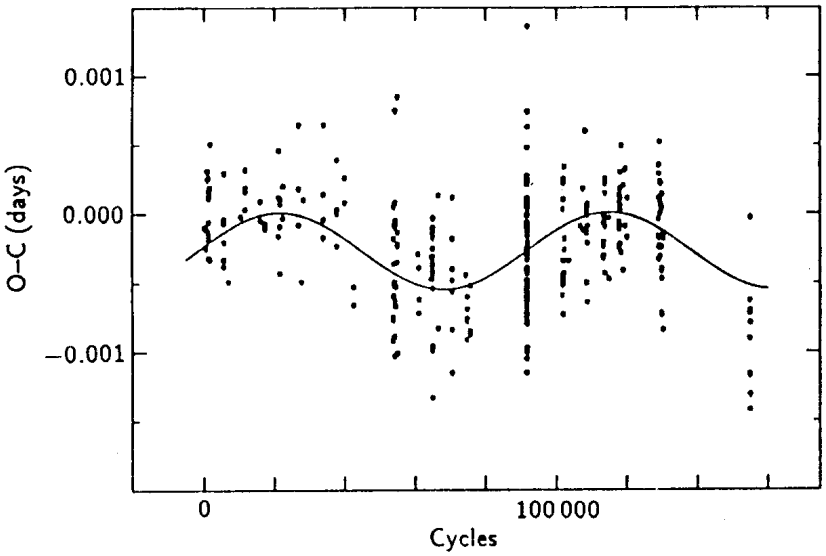

FIGURE 1: Residuals of eclipse timings

EX Hya contains a magnetic white dwarf which produces a prominent sinusoidal photometric modulation at the 67-min rotation period. This period is decreasing secularly, presumably due to the accretion of angular momentum. We have measured the times of spin maxima in the light curves by eye, for consistency with previous work (Table 1). The residuals against the linear ephemeris of Vogt *et al.* (1980) are shown in Fig. 2 along with the compilation of previous data. A quadratic fit to the data gives the ephemeris:

$$TDB_{67-\max} = 2437699.8914(5) + 0.046546504(9)E - 7.9(4) \times 10^{-13}E^2$$

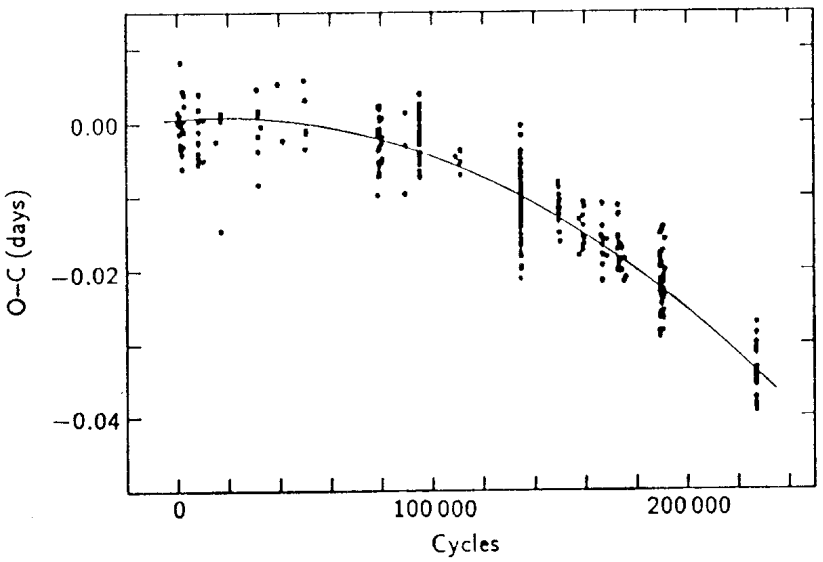

FIGURE 2: Residuals of spin maximum timings

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