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HD 217188 : A LONG-PERIOD CHROMOSPHERICALLY ACTIVE VARIABLE

We began photometry of HD 217188 after noting that Bidelman (1981) had seen moderately strong Ca II H & K emission in its spectrum. The spectral type is K0 according to the HD Catalogue and gK0 according to Bidelman (1981). We found nothing in the literature to indicate it is a binary system.

Henry observed differentially with the 48-inch telescope at Cloudcroft Observatory on 11 nights in 1982, in B and V of the UBV system. Boyd's automatic 10-inch telescope at Fairborn Observatory observed on 47 nights of September through December 1984, in UBV. Henry used BD -1^o4373 as a comparison star. Boyd used 3 Psc = HR 8750 as a comparison star and 2 Psc = HR 8742 as a check star. The nightly means of Henry's BV photometry are listed in Table I. Part of Boyd's photometry has been discussed already (Boyd et al. 1985) and the rest will be published later.

It was immediately obvious from both the 1982 and 1984 photometry that HD 217188 was variable with a period of 80 or 90 days. The 844-day interval between the well-defined minima in 1982 and 1984 indicated therefore that the period was either 76^d.7, 84^d.4, or 93^d.8 depending on whether the number of cycles between was 11, 10, or 9. Two lines of reasoning made us prefer $\Delta n = 10$. (1) Least squares sinusoidal fits of the 1982 data, with a range of periods assumed, indicated $P = 86 \pm 6$ days. (2) The uppermost part of the falling branch was covered twice in 1984, with the interval between being approximately 84 days.

The above-mentioned sinusoidal fit yielded $JD\ 2445165.0 \pm 1^d.0$ as a time of minimum brightness in 1982. Application of the Pogson method yielded $JD\ 2446008.5 \pm 0^d.5$ as a time of minimum in 1984. Assuming $\Delta n = 10$, we get an ephemeris of

$$JD\ 2446008.5 + 84^d.35\ n \quad (1) \\ \pm .5 \quad \pm .11$$

for times of minimum.

Boyd's 1984 photometry is plotted in Figure 1, where each point is a mean of three separate ΔV measures. Similar means of Henry's 1982 photometry are plotted in the same figure, with each value of ΔV made fainter by 3^m.26 (because a different comparison star had been used) and moved forward ex-

Table I

Differential Photometry of HD 217188 at Cloudcroft Observatory

JD(hel.)	ΔV	ΔB	JD(hel.)	ΔV	ΔB
2445120.9211	$-2^m.153$	--	2445168.9172	$-2^m.008$	$-2^m.198$
121.9460	-2.160	--	187.7425	-2.063	--
146.9585	-2.053	--	188.9249	-2.107	--
160.9294	-1.998	-2.195	191.9434	-2.092	--
167.9085	-1.997	-2.196	196.8462	-2.104	--
			213.7824	-2.115	--

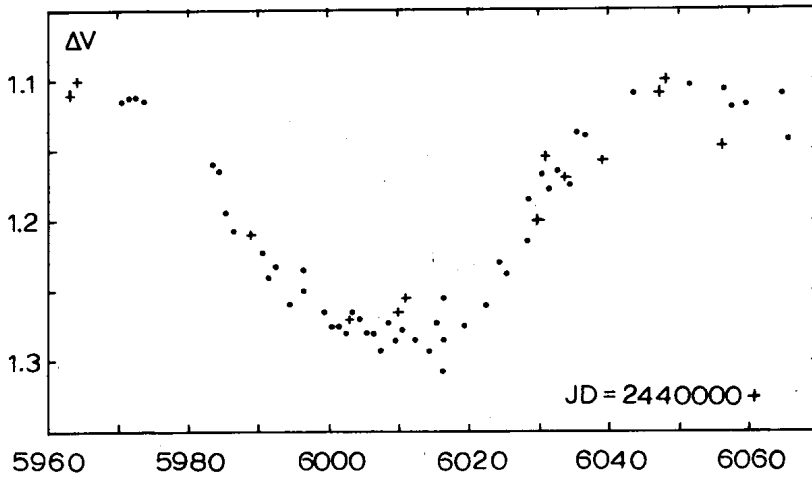


Figure 1

Light curve of HD 217188, where ΔV is in the sense variable minus 3 Psc. Points are from Fairborn Observatory in 1984. Pluses are from Cloudcroft Observatory in 1982, made fainter by $3^m.26$ (because a different comparison star had been used) and advanced exactly 10 cycles of the 84.35-day period. Notice the amplitude was larger in 1984 than in 1982.

actly $843^d = 10$ cycles. Actually, Henry's earliest two points are plotted twice, advanced 10 cycles and 11 cycles. The light variation in 1984 showed a full range of $\Delta V = 0^m.18$, $\Delta B = 0^m.22$, and $\Delta U = 0^m.25$. In 1982 the full range in ΔV apparently was $0^m.03$ or $0^m.04$ less.

The 1982 edition of the Bright Star Catalogue remarks that Boyd's comparison star 3 Psc is a suspected pulsating variable with an amplitude of $0^m.018$ in V. There is no doubt, however, that HD 217188 is the variable, because its relatively large variation showed up when two different comparison stars were used. Moreover, a small variability in 3 Psc (if it proves to exist) can affect our light curve of HD 217188 only insignificantly. Our differential measures between 3 Psc and the check star 2 Psc confirm this: 51 means obtained on the same 47 nights in 1984 show an rms deviation of only $\pm 0^m.004$ in V.

The catalogue of Nicolet (1978) gives the following magnitudes for 3 Psc: $V = 6^m.21$, $B-V = 0^m.89$, and $U-B = 0^m.60$. Inspection of Figure 1 shows, therefore, that HD 217188 ranges in brightness between $V = 7^m.32$ and $V = 7^m.50$.

It will be interesting to see if better spectrograms prove the spectrum composite or reveal radial velocity variations which indicate that HD 217188 is binary, because chromospherically active binaries with very long periods are somewhat unusual.

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