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UBV OBSERVATIONS OF AB Dor, 1994-5

The active, cool (early K type) dwarf AB Dor (= HD 36705, SAO 249286) has been at the focus of much attention recently (cf. Vilhu *et al.*, 1993; Collier Cameron, 1995; and references cited therein). The ephemeris of Innis *et al.* (1988), $\text{Min} = 2444296.575 + 0.51479 \times E$, is usually used (as here) for reckoning phases.

The star was observed in *B* and *V* ranges on 12 nights between Nov 3, 1994 and Jan 6, 1995 with the 20cm S-C telescope and DC photometer of the Mt Molehill Observatory (cf. Bos, 1994). Observations were also made using the automated photometer ('APT') at the Kotipu Place Observatory on four nights between 26 Oct and 14 Dec, 1994, using the *UBV* filters provided with the SSP 5 'Optec' photometer (cf. Hudson *et al.*, 1993). Most of this latter data come from two nights 26 Oct and 1 Nov; data from 6 and 14 Dec were prematurely terminated by an APT tracking fault.

Standard broadband differential photometric reduction procedures were followed (cf. e.g. Budding, 1993). The main comparison star was again HD 37297 ($V = 5.34$, $B - V = 1.04$, $U - B = 0.85$, sp. type K0III — cf. SIMBAD). This comparison was regularly checked against HD 37279 at Mt Molehill (Table 1), showing the stability of HD 37297 to within 0.01 mag, except on Nov 9, when poorer weather affected the data (Figure 1a, phase range 0.0 — 0.4). At Kotipu Place HD 37279 was checked against HD 35537, also a K0III star (Budding *et al.*, 1994).

Table 1. Check star HD 37279 (mean values)

Date	<i>n</i>	<i>V</i> mag	S.D.	<i>B - V</i>	S.D.
Dec 1992 - Jan 1993	14	7.429	0.007	0.258	0.006
Nov 1993 - Jan 1994	47	7.432	0.009	0.257	0.009
Nov 1994 - Jan 1995	82	7.432	0.008	0.257	0.009

Here S.D. = standard deviation, Nov 09 1994 data not included

The resulting data have been plotted up as follows: Figure 1 (a-c) the Mt Molehill *V* data, Figure 2 montage of the APT (preliminary) *U*, *B*, *V* data. Although none of these data sets are quite complete, they indicate trends in the variability towards the end of 1994 and beginning of 1995. The main characteristics of the Mt Molehill data sets are listed in Table 2. Figure 2 results from binning about 340 individual observations in each colour into about 45 'normal' points.

Table 2. Variability of AB Dor — amplitude and minimum phase

	Max.	Min.	Amplitude	Phase
Figure 1a	6.81	6.92	0.11	0.50
Figure 1b	6.82	6.92	0.10	0.42
Figure 1c	6.81	6.89	0.08	0.41

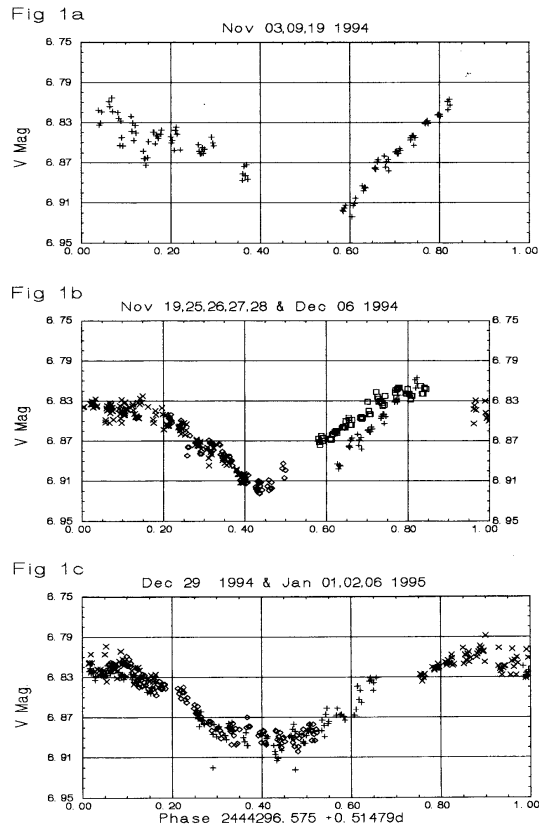


Figure 1. AB Dor: *V* light curves from Mt Molehill

AB Dor
Binned data

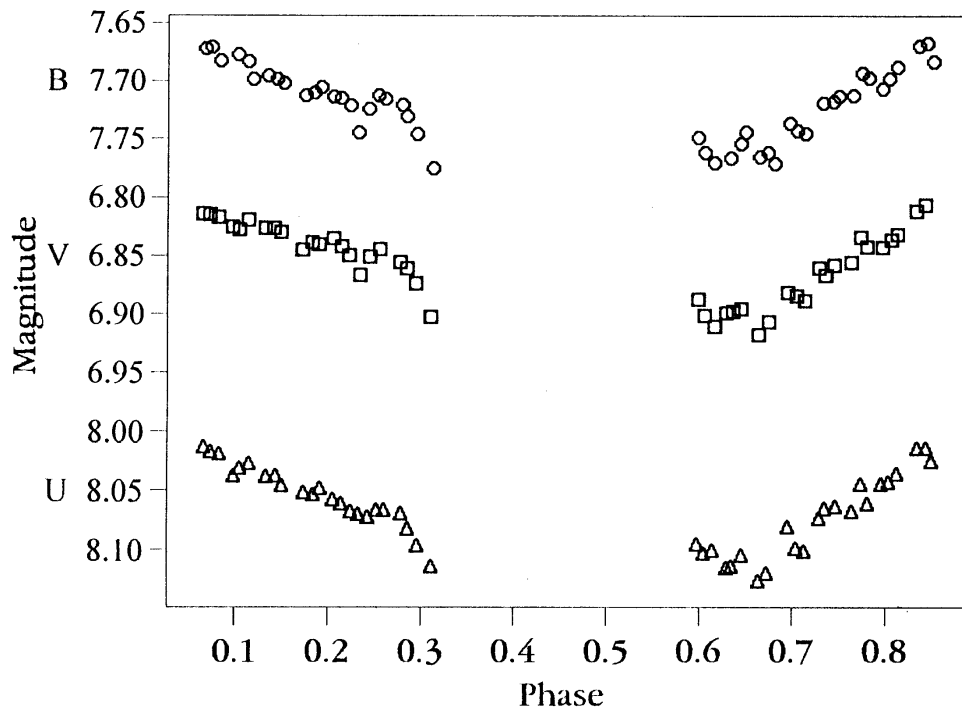


Figure 2. AB Dor: *U*, *B*, *V* light curves from Kotipu Place APT

The observed minima are associated with what is taken to be spot B of Innis *et al.* (1988), rather than spot A, which relates with the minima reported for the preceding year Anders (1994), Bos (1994) and Budding *et al.* (1994). What remains of spot A is perhaps the noisy maximum near phase zero in Figures 1b,c, though asymmetry is also noticeable in the shape of the main minimum.

Figure 1b shows a definite change in the slope of the rise between the observations made on November 19 and December 06 1994. The minimum of the light curve in Figure 1c is not as deep as that observed four weeks earlier (Figure 1b, Table 2). Because no clear minimum or maximum was observed in early November there is some uncertainty about the phase of minimum and the amplitude of the light curve then. It is, however, not less than 0.10 magnitudes and may have been as much as 0.12. The phase of minimum in Figure 1a must be somewhere near 0.5, though it may be closer to 0.4, as for Figures 1b,c.

AB Dor has remained at much the same brightness at maximum (6.82 V) as 12 months earlier. Both Bos (1994) and Budding *et al.* (1994) observed a small drop in $B - V$ coinciding with the minima of November 1993. There appears to be some evidence of this in the 1994/1995 data as well, but less clearly than before.

Incompleteness of the APT data-sets about the minimum is frustrating, though it supports the slight apparent deepening near phase 0.3 in December 1994, and a tendency of the curve to rise near phase 0.6 around that time (Figures 1b,c). This could be interpreted as a tendency of the minimum again to drift down in phase during the period late October 1994 to the end of the year, as suggested also for the preceding year's data (Budding *et al.*, 1994).

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