

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 3232

Konkoly Observatory
Budapest
1 September 1988
HU ISSN 0374 0676

UBV(RI)c PHOTOMETRY OF AB Dor**

AB Dor = HD 36705 is a rapidly-rotating late-type star having strong Ca II emission lines (Bidelman and MacConnell, 1973). Almost certainly due to its very high $v \sin i$ (~ 100 km/s), this star has been variably classified as K1 IIIp, K2 IVp and KO IV-V. Pakull (1981) discovered a photometric period of 0.51423 days and, because of variable optical and X-ray fluxes, classified AB Dor as an RS CVn system. There is no clear evidence, however, that the star is double and AB Dor has been successively classified as an FK Com (Collier 1982), a still contracting post T-Tau or a BY Dra star (Rucinski 1982). None of the interpretation of the evolutionary status of AB Dor is completely satisfactory. For further details see also Innis et al. (1985), Pallavicini et al. (1987), Collier Cameron et al. (1988), and the references therein.

AB Dor was observed at La Silla in 1985 by one of us (GC), from November 19 to 28, with the 50 cm ESO Cassegrain reflector equipped with a single-channel photon-counting, cooled photometer using an RCA 31034 tube. HD 37297 (=CP-64^o456=SAO 249309=HR 1917) was used as comparison, while HD 35230 (=CP-68^o347=SAO 249241) and HD 38616 (=CP-67^o492=SAO 249336) served as check stars; they showed no significant variability during the period of the observations. The observations were corrected for atmospheric extinction and were transformed to the UBV(RI)c system by observing Cousins' E-region standard stars.

The following magnitudes were derived for the comparison and check stars (the standard deviation is about .01 mag, or less):

Star	U	B	V	R	I
HD 37297	7.22	6.39	5.35	4.79	4.33
HD 35230	8.92	8.46	7.58	7.09	6.66
HD 38616	6.89	7.01	7.03	7.01	7.04

** Based on observations collected at the European Southern Observatory, La Silla, Chile

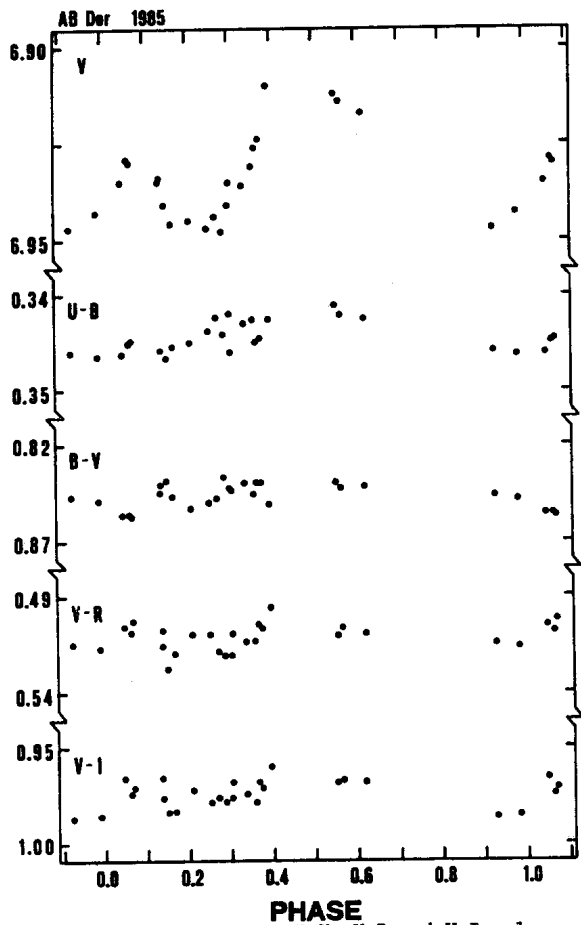


Figure 1: V light curve and U-B, B-V, V-R and V-I color variations of AB Dor in November 1985. The phases are computed using the ephemeris $HJD=2444296.575+0.51423 \times E$ given by Pakull (1981).

Figure 1 shows the V light curve and the U-B, B-V, V-R and V-I color variations. In Table I the heliocentric JD, the phase (computed using the ephemeris $HJD= 2444296.575+0.51423 \times E$ given by Pakull 1981), the V magnitude and the color indices are presented. The typical standard deviation is .005 mag for the V data and .007 for the color indices. The light curve, though incomplete, is clearly double-peaked with maxima at phase 0.45 ($\pm .05$) and 0.1 ($\pm .025$), respectively. The color variations are in agreement with the starspot hypothesis: the star appears redder at light minimum.

3
Table I

HJD (2446000.+)	Phase	V	U-B	B-V	V-R	V-I
389.8088	.6178	6.917	0.354	0.842	0.510	0.968
390.8090	.5629	6.914	0.352	0.843	0.507	0.967
391.8315	.5519	6.912	0.347	0.840	0.511	0.968
392.7598	.3564	6.931	0.354	0.846	0.514	0.978
.7681	.3726	6.924	0.364	0.840	0.507	0.971
393.6824	.1507	6.941	0.374	0.839	0.528	0.983
.6901	.1657	6.946	0.368	0.847	0.520	0.983
394.7719	.2694	6.944	0.353	0.848	0.519	0.976
.7878	.3003	6.941	0.351	0.843	0.521	0.976
.8058	.3347	6.936	0.356	0.840	0.514	0.974
.8208	.3643	6.926	0.366	0.840	0.505	0.968
.8358	.3936	6.910	0.354	0.851	0.496	0.960
395.6940	.0625	6.929	0.366	0.856	0.509	0.974
.7328	.1379	6.934	0.370	0.841	0.516	0.976
.7687	.2078	6.945	0.366	0.853	0.510	0.972
.8088	.2858	6.948	0.362	0.837	0.521	0.978
.8176	.3029	6.935	0.371	0.844	0.510	0.968
396.6805	.9809	6.943	0.373	0.849	0.517	0.985
.7145	.0469	6.935	0.372	0.856	0.506	0.966
.7603	.1362	6.935	0.370	0.845	0.508	0.966
.8194	.2511	6.947	0.360	0.850	0.510	0.978
397.6806	.9257	6.947	0.371	0.847	0.515	0.986
.7539	.0683	6.930	0.365	0.857	0.503	0.971

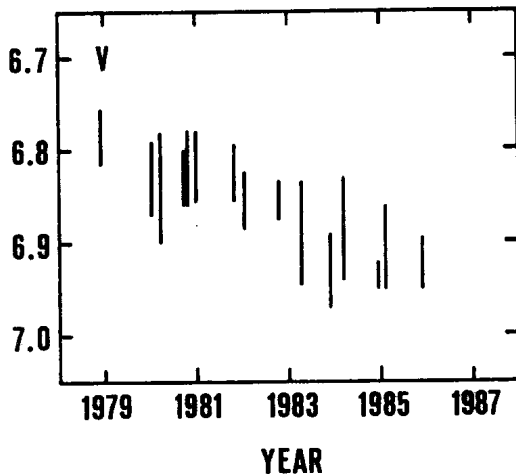


Figure 2: Collection of all published photometric data of AB Dor. The vertical bars indicate the peak-to-peak V amplitude of the light curves.

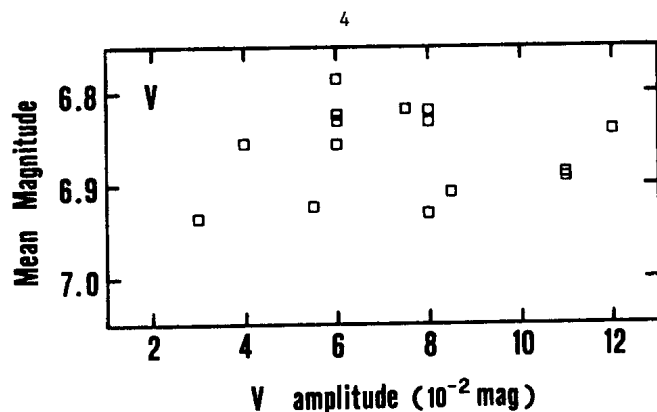


Figure 3: Mean V magnitude of AB Dor as a function of the corresponding peak-to-peak V amplitude.

In Figure 2 collection of all published photometric data of AB Dor is presented, with vertical bars indicating the peak-to-peak amplitude of the light curves. It is evident that the mean magnitude of AB Dor has been increasing during the last seven years. Clearly, the degree of spottedness has been increasing, but no systematic correlated change of the light curve amplitude is apparent. This is shown in Figure 3, where the peak-to-peak V amplitudes of the light curves and the corresponding mean magnitude are reported. The uncorrelated behaviour of the light curve amplitude and mean V magnitude suggests that the spot areas form at different longitudes and/or latitudes. In fact, spot surface distributions leading to the same mean magnitude and different amplitude or to the same amplitude and different mean magnitude appear to occur. We are developing a quantitative analysis of this behaviour in terms of differential rotation.

G. CUTISPOTO and M. RODONÓ
 Catania Astrophysical Observatory
 and Astronomy Institute of Catania University
 v.le A. Doria, 6
 I-95125 Catania, Italy

References:

- Bidelman, W.P., MacConnell, D., 1973, *Astron.J.*, 78, 687.
 Collier, A.C., 1982, *Monthly Notices Roy.Astron. Soc.* 200, 489.
 Collier Cameron, A. et al., 1988, *Mont.Not.R.Astron.Soc.* 231, 131.
 Innis, J.L., Robinson, R.D., Coates, D.W., Thompson, K., 1985, *Proc.ASA*, 6, 156.
 Pakull, M.W., 1981, *Astron.Astrophys.*, 104, 33.
 Pallavicini, R., Cerrùti-Sola, M., Ducan, D.K., 1987, *Astron.Astrophys.*, 174, 116.
 Rucinski, S.M., 1982, *Inf.Bull.Var.Stars.*, No. 2203.