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NEW PHOTOELECTRIC LIGHT CURVES OF AB ANDROMEDAE

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AB And (SAO 73069, BD +36°5017), is a W UMa type eclipsing binary (sp. type G5+G5V, $P \approx 0.3318$ days, $V_{\max} \approx 9.7$). Since the discovery (Guthnick & Prager 1927) the system is a frequent target of photometric observations (for references see Rovithis-Livaniou & Rovithis 1981; Demircan et al. 1994). The system exhibits asymmetries in minima and deformations in the light curve during maxima, interpreted either by the presence of gaseous streams (Kalchaev & Trutse, 1968) or by spot activity on the primary component (e.g. Bell et al. 1984). Observed orbital period changes are caused probably by combination of the mass transfer from the more to less massive component and the light time effect (see Kalimeris et al. 1994; Borkovits & Hegedüs 1996) or a period modulation due to the magnetic activity cycle of the active primary component (Demircan et al. 1994)

Our U, B, V and R photoelectric photometry was performed over 6 nights from August to December 1999 at the Stará Lesná (SL) and Skalnaté Pleso (SP) Observatories of the Astronomical Institute of the Slovak Academy of Sciences. The 0.6 m Cassegrain telescope equipped with a single-channel pulse-counting photoelectric photometer was used. The journal of observations is listed in Table 1. For all observations a 10 second integration was chosen. SAO 73071 was used as a comparison star (Table 2). Its stability was checked on two nights (August 19 and December 31, 1999) with respect to six other

Table 1: Journal of photometric observations

Date	HJD_{mean} 2400000 +	Phases	Filters	Obs.
1999 Aug. 19	51140.4070	—	UBV	SL*
1999 Sep. 4	51426.3828	.927–.058	UBV	SL
1999 Oct. 1	51453.4659	.123–.980	UBV	SL
1999 Dec. 8	51521.3016	.782–.195	BV	SL
1999 Dec. 21	51534.2575	.839–.259	BVR	SP
1999 Dec. 31	51544.3079	—	UBV	SP*

* Measurement of comparison stars only

Table 2: Comparison stars and their magnitudes

Star	SAO	BD	U	B	V	Sp.
S1	73115	+35°4988	9.54	9.48	8.93	—
S2	73071	+36°5020	10.10	9.30	8.37	K2
CH	73072	+35°4972	11.48	10.92	10.05	—
S5	73093	+34°4870	10.72	9.75	8.65	—
S6	72992	+36°5003	9.03	7.92	6.76	K0
S7	73003	+37°4769	9.09	8.87	8.21	G5
S8	73007	+34°4847	8.67	7.55	6.39	K0

Note: Star S8 was measured only on December 31, 1999

stars. The comparison star was found to be stable within 0.01 mag. The international magnitude of comparison stars, calculated using the average of the published magnitudes of S6 (see `http://obswww.unige.ch/gcpd/gcpd.html`), are given in Table 2. Their mean errors are lower than 0.01 mag. Data reduction, the atmospheric extinction correction and transformation to the standard system were carried out in the usual way.

We have calculated the times of minima separately for all filters using the Kwee and Van Woerden's method, parabola fit, sliding integration method, tracing paper and "center of mass" method which were described in detail by Ghedini (1982). The computer codes were kindly provided by Dr. R. Komžík (1999). The average times of the primary (I) and secondary (II) minima and their probable errors found by these methods are given in Table 3.

Recent times of minima (Borkovits & Bíró, 1998; Kiss et al., 1999; Agerer & Hübscher, 1999) together with average times of the minima from U,B,V and R passbands (Table 3) were used to determine the ephemeris suitable for future observations:

$$\begin{array}{c} \text{Min (I)} = \text{HJD } 2451426.3875 + 0^{\text{d}}.3318925 \times E. \\ \qquad\qquad\quad \pm 5 \qquad\quad \pm 4 \end{array} \tag{1}$$

All individual U, B and V observations are plotted in Fig. 1, using ephemeris (1). These data sets can be freely downloaded from address:

`http://www.ta3.sk/parimuch/archive.html`.

The observed light curves were relatively stable during our observations except small variations in the depth of the primary minimum. The maximum at phase 0.25 was somewhat brighter than maximum at phase 0.75. The descending branch of the primary minimum in B passband observed on December, 21 is fainter than on the other nights.

Table 3: New times of minima and their standard errors (σ) of AB And

HJD 2400000+	σ	Min. type	Filter	HJD 2400000+	σ	Min. type	Filter
51426.38808	0.00014	I	U	51521.30847	0.00013	I	B
51426.38763	0.00010	I	B	51521.30855	0.00004	I	V
51426.38807	0.00007	I	V	51534.25069	0.00024	I	B
51453.43763	0.00002	II	U	51534.25116	0.00018	I	V
51453.43715	0.00001	II	B	51534.25222	0.00021	I	R
51453.43705	0.00002	II	V				

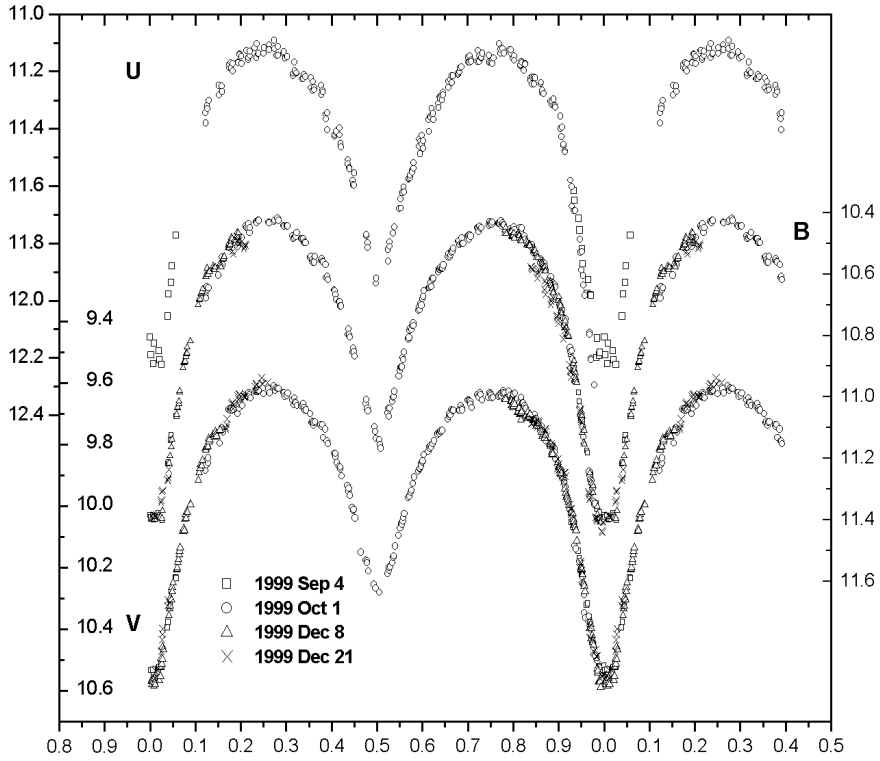

Figure 1. UBV light curves of AB And

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