

**PHOTOMETRIC INVESTIGATION OF THE  
SEMIDETACHED SYSTEM V836 CYGNI**

Variable star V836 Cyg is a single-lined EB-type eclipsing binary with a short orbital period of 0.653 day. Communications about the instability of its light curves attracted our attention and we performed observations of the variable.

There are several observational studies of V836 Cyg in the last two decades (Wester, 1977, Breinhorst & Duerbeck, 1982). Photometric analyses of the observations, based on various LC-synthesis methods, yield almost contact configurations of the system with a mass ratio  $q$  from 0.4 to 0.5. The assumption that both components are MS stars together with its spectroscopic mass function (Duerbeck & Schumann, 1982) and the surface intensity ratio (from LC-solutions) indicate a lower value of  $q$  limited by the interval from 0.30 to 0.38 (Breinhorst & Duerbeck, 1982). Moreover Breinhorst et al. (1989) by evaluating of analysis of four-color Strömrgren observations indicated the mass ratio near  $q=0.34$ .

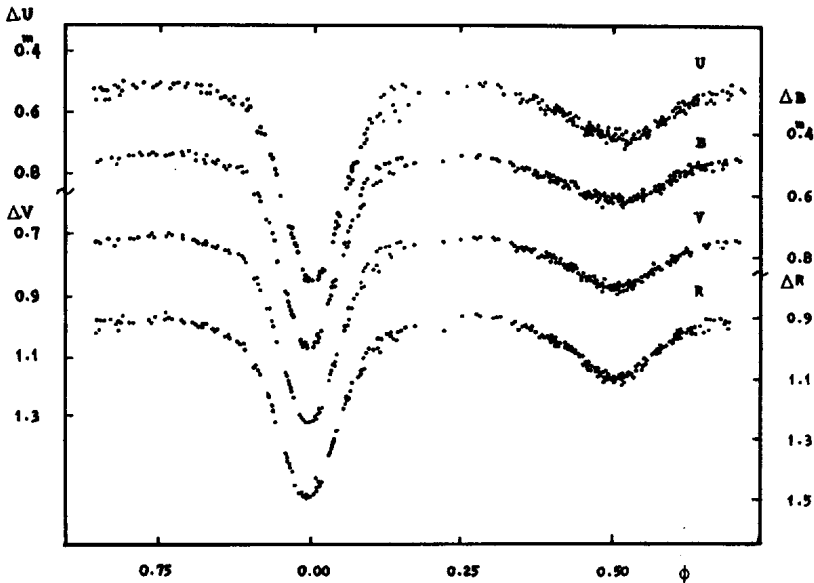


Figure 1. UBVR light curves of V836 Cyg. Magnitude differences are given in sense "variable minus comparison".

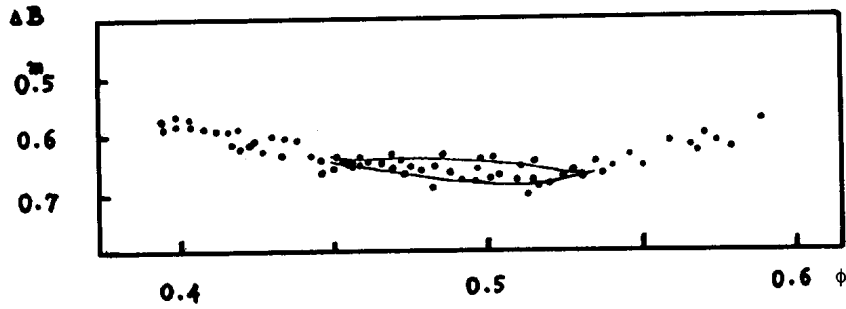


Figure 2. B-band's variations of the light curve in min II.  
The observations obtained during the different nights are shown by lines  
(upper - 13 August, lower - 28 August).

Consequently the system V836 Cyg should consist of MS-primary and oversized G-type secondary. From all these studies follows that the system has evolved through the stage of rapid mass exchange with mass ratio reversal.

Our observations were obtained in August 1989 with a single-channel UBVR photometer (Neizvestny & Pimonov, 1978) attached to the 60-cm Zeiss reflector of the Special Astrophysical Observatory of the Russian Academy of Science. BD+35°4461 was used as a comparison star and BD+35°4460 as a check one.

To eliminate short time-scale variations from light curve our set of observations covers a short interval about 30 cycles. However some variations of light curve may be revealed from our data, namely: distortion of min II and transient light deficiency in the phase 0.1-0.2 (see Figure 1 and Figure 2) even on very short time interval.

The moments of minima deduced by Kwee - van Woerden method (Kwee & van Woerden, 1956) are tabulated in Table 1.

Table 1.  
Moments of minima of V836 Cyg (JD hel)

U	B	V	R	Min	E	(O-C) <sub>v</sub>
2447749.4176	.4176	.4176	.4171	1	9963.0	+0.0105
±5	±1	±2	±3			
			761.5029	2	9981.5	+0.0077
			±14			
			763.4648	2	9984.5	+0.0100
			±7			
764.4462	.4463	.4461	.4457	1	9986.0	+0.0106
±3	±3	±2	±3			
			767.3829	2	9990.5	+0.0070
			±14			

The shape of the secondary minima has been distorted, therefore the moments of min II has low precision. In Table 1 the moments of these minima are presented as mean values from four ones. O-C values were calculated by linear light elements from Breinhorst & Duerbeck (1982). The authors satisfactorily represented O-C by parabola. In our opinion sinusoidal variations in the period are probable too.

The photometric analysis of our multicolor observations was based on light curve synthesis method performed in Sternberg Astronomical Institute (Balog, Goncharsky & Cherepashchuk, 1981). Received parameters of the binary are listed in Table 2.

Table 2.  
Orbital elements of V836 Cyg

	U	B	V	R	Mean error
q	0.340	0.335	0.335	0.330	$\pm 0.005$
$\mu_1$	0.890	0.890	0.895	0.890	$\pm 0.005$
$\mu_2$	0.960	0.953	0.955	0.960	$\pm 0.005$
i	81.5	81.0	81.0	81.5	$\pm 0.5$
T <sub>1</sub>	10800	10800	10800	10800	assumed
T <sub>2</sub>	6900?	6600	6550	6500	$\pm 50$
u <sub>1</sub>	0.4	0.4	0.3	0.3	assumed
u <sub>2</sub>	0.8	0.8	0.6	0.5	assumed

$\mu$  is the ratio of the polar radius of the star to the polar radius of the critical Roche-lobe.

The geometry of the system received from our solutions confirmed the suggestion that V836 Cyg is almost semidetached binary. But the secondary seems to be hotter than G1 as derived in previous investigations. In those cases the secondary's characteristics remained as an open question up to receiving more reliable data.

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