BVR PHOTOMETRY OF THE CONTACT BINARY STAR
V829 HERCULIS

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V829 Her (GSC 02597-00679 = TYC 2597-679-1) was discovered serendipitously as an X-ray source during the Einstein Observatory Extended Medium Sensitivity Survey (Gioia et al., 1987). It was suspected to be a W UMa system by Fleming et al. (1989). Soon thereafter, Robb (1989) obtained photometric observations of the system and confirmed the W UMa variability type. He found a period of 0.35813 days, which was only approximate because of the short time span. Later, Agerer & Hübscher (1995, 1999, 2000) obtained some minima times. Lu & Rucinski (1999) observed this system spectroscopically and determined its spectroscopic orbit, suggesting that V829 Her is a W-type W UMa system, according to semi-amplitudes of the radial velocity curve of the system.

The system was observed photoelectrically at the Çanakkale Onsekiz Mart University (ÇOMU) Ulupınar Astrophysics Observatory. The observations were performed in the observational season of 2003. The 40-cm Cassegrain reflector equipped with the SSP5-A photometer and Hamamatsu R 6358 photomultiplier tube was used. All observations were made with the B, V and R filters of the Johnson $UBVRI$ system. BD $+38°2701$ and BD $+38°2708$ were used as comparison and check stars, respectively. During the observations no significant light variation of the comparison and check star was found. The atmospheric extinction coefficients in each colour for each observational night were calculated from the observations of the comparison star using conventional methods. Then, all the differential B, V and R magnitudes (in the sense variable minus comparison) were corrected for atmospheric extinction. The probable error of a single observation point was estimated to be ±0.01 for three filters.

During the observations, six primary and two secondary times of minimum light were obtained. These times of minima and their errors, which were determined by using the method of Kwee & van Woerden (1956), are presented in Table 1. The times of the minima given in Table 1 are averaged values of the eclipse times obtained in B, V and R colors during the same night. We have combined the epoch derived by previous authors with our values in order to derive a new epoch and period of the system (see Table 1). The $O - C$ values and epoch numbers E were calculated with the following light elements, given by Lu & Rucinski (1999):

$$\mathrm{HJD}_{\mathrm{min\,I}} = 2447680.8910 + 0\overset{\mathrm{d}}{.}3581502 \times E. \tag{1}$$

Table 1: Photometric minima times of V829 Her

JD Hel. 2400000+	Method	Filter	Min Type	$O - C$	Reference
47680.8883	pe	VRI	I	−0.0027	Robb (1989)
47681.7883	pe	VRI	II	0.0019	Robb (1989)
47682.8607	pe	VRI	II	−0.0001	Robb (1989)
47684.8283	pe	VRI	I	−0.0024	Robb (1989)
47687.8751	pe	VRI	II	0.0002	Robb (1989)
47689.8448	pe	VRI	I	0.0001	Robb (1989)
48505.7163	pe	VRI	I	0.0054	Robb (1992), Lu & Rucinski (1999)
49545.4195	pe	BV	I	−0.0014	Agerer & Hübscher (1995)
50585.4816	pe	BV	I	−0.0075	Agerer & Hübscher (1999)
51294.4410	pe	BV	II	−0.0064	Agerer & Hübscher (2000)
52777.3698	pe	BVR	I	0.0015	this study
52797.4252	pe	BVR	I	0.0004	this study
52803.5168	pe	BVR	I	0.0035	this study
52821.4217	pe	BVR	I	0.0009	this study
52845.4178	pe	BVR	I	0.0009	this study
52846.3105	pe	BVR	II	−0.0018	this study
52846.4903	pe	BVR	I	−0.0010	this study
52885.3507	pe	BVR	II	0.0001	this study

The $O - C$ residuals versus E values are shown in Fig. 1. From Fig. 1, it is seen that the orbital period change could be sinusoidal with very small amplitude. A reasonable fit to the $O - C$ variation can be achieved by using the following sinusoidal ephemeris:

$$(O - C) = A_s \sin\left[\frac{2\pi}{P_s}(E - T_s)\right], \tag{2}$$

where A_s is the semi-amplitude, P_s the period and T_s the time of minimum of the sinusoidal variation. A weighted least squares solution for T_0, P, and A_s, P_s and T_s are given in Table 2. The best sinusoidal fit, and also the residuals are plotted against epoch number in Fig. 1.

The differential B, V and R light, and $B - V$ and $V - R$ color curves in the instrumental system are shown in Fig. 2 folded using the elements from data with $E > 8000$:

$$\mathrm{HJD_{min\,I}} = 2452797.4251(6) + 0^{\mathrm{d}}\!.3581516(2) \times E. \tag{3}$$

The shape of the light curves is typical of W UMa type. There is no significant sign of any asymmetry at maximum lights (O'Connell effect) of the BVR light curves and the depths of secondary minima are deeper than that of primary minima in BVR light curves (see Table 3). This indicates that V829 Her is a W type W UMa eclipsing binary.

The photometric analysis of the light curves is in progress and will be published elsewhere.
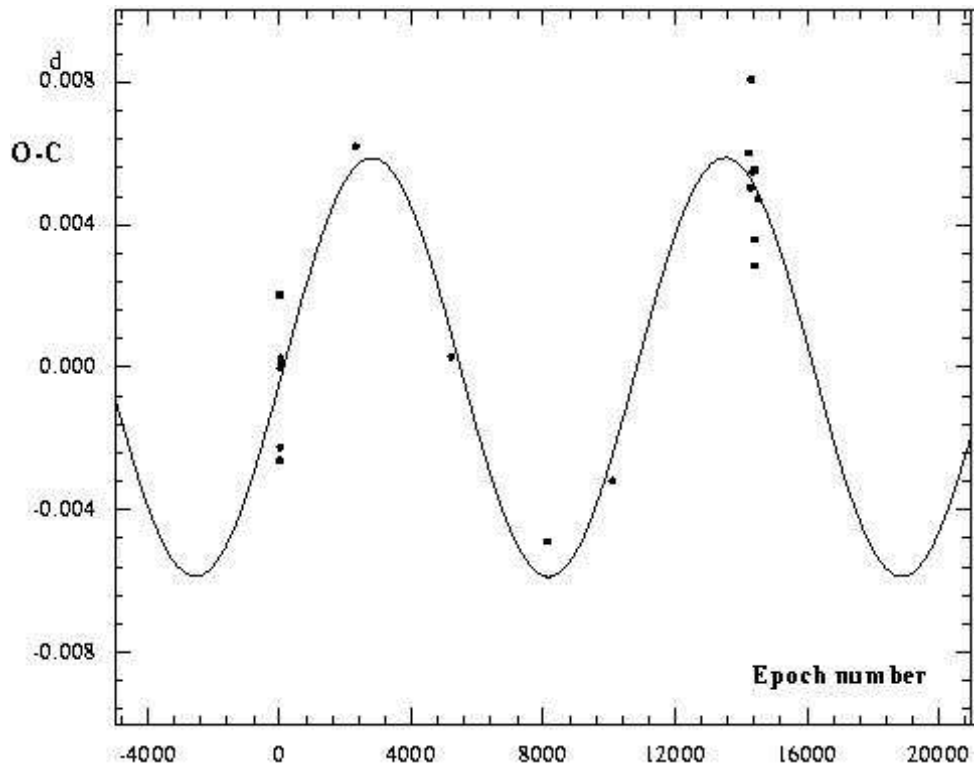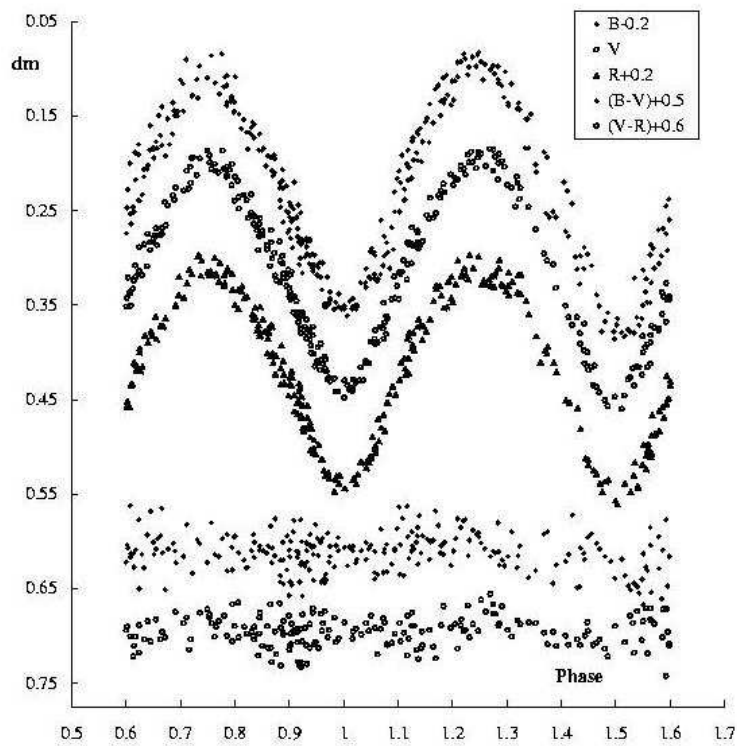
Figure 1. The O-C diagram for V829 Her

Figure 2. The light and color curves of V829 Her obtained in 2003. Phases were calculated with the ephemeris (3).

Table 2: Parameters for the O-C sinusoidal solution

Parameter	Value	Standard deviation
T_0 HJD	2447680.8909	0.0011
P (day)	0.3581499	0.0000001
A_s (day)	0.006	0.001
P_s (year)	10.5	0.5
T_s (cycle)	115	347
$\Sigma W(O-C)^2 (day^2)$	3.3×10^{-5}	

Table 3: The light levels and their differences in the light curves of V829 Her

	B	V	R
Max. light at 0.75	0.300(9)	0.197(8)	0.110(5)
Max. light at 0.25	0.295(9)	0.194(8)	0.112(6)
Min. light at 0.00	0.555(9)	0.441(9)	0.340(7)
Min. light at 0.50	0.575(9)	0.455(9)	0.355(6)
Δmax. $(m_{0.75} - m_{0.25})$	0.005	0.003	−0.002
Δmin. $(m_{0.00} - m_{0.50})$	−0.020	−0.014	−0.015
Depth of Min. I	0.258	0.246	0.229
Depth of Min. II	0.278	0.260	0.244

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ERRATUM FOR IBVS 5496

Erratum for the paper IBVS No. 5496 titled *"BVR Photometry of the Contact Binary Star V829 Herculis"*: the comparison and check stars were given in the paper as BD+38°2701 and BD+38°2708, respectively. They should be BD+35°2882 for comparison and BD+35°2891 for the check star.

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