

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

Number 2965

Konkoly Observatory  
 Budapest  
 15 December 1986  
 HU ISSN 0374-0676

PHOTOELECTRIC OBSERVATIONS OF  $\theta$  CrB IN 1984-86

The Be-star  $\theta$  CrB was included on our observational programme in mid 1984 after Harmanec's (1983) predicted time of possible eclipse. The three colour UBV photoelectric observations of  $\theta$  CrB presented in this paper were performed at the University Observatory in Brno in the course of the years 1984-86.

The photomultiplier and filter combinations on a one-channel photoelectric photometer attached to the 24-inch telescope were the same as in Papoušek (1974). The instrumental photometric system was close to the standard UBV system and the transformations from the instrumental system to the UBV one and the differential extinction corrections were applied to all the observations in the usual way.

HR 5760 (= HD 138341) served as a primary comparison star, the stars 50 Boo and BD +32<sup>o</sup>2607 (= SAO 64824) were used as check stars. Their brightness and colour indices - as observed by us - are given in Table I.

Table I

Photometric data for comparison and check stars

Star	V	B-V	U-B
HR 5760 = comparison	6.440 <u>+2</u>	+0.188 <u>+3</u>	+0.126 <u>+4</u>
50 Boo = check 1	5.368 <u>+1</u>	-0.065 <u>+3</u>	-0.210 <u>+2</u>
BD +32 <sup>o</sup> 2607 = check 2	7.205 <u>+4</u>	+0.228 <u>+3</u>	+0.095 <u>+5</u>

The photometric values of 50 Boo were derived from the observations of 16 standard stars in the neighbourhood of  $\theta$  CrB during three nights. The values of HR 5760 were derived from differential observations to the 50 Boo in 38 nights in 1985-86 and scattering of individual measurements did not exceed  $\pm 0.015$  in V,  $\pm 0.020$  in B, and  $\pm 0.025$  in U colour, respectively. Data for check star 2 were computed from differential observations to the comparison star

and to 50 Boo in 41 nights and scattering of its values is similar as for HR 5760.

The variable star  $\theta$  CrB was observed in 57 nights, between 22.5.1984 and 4.10.1986 and about 1300 individual measurements were obtained. These observations in different nights are presented in Table II, where phases are computed according to the ephemeris given in Harmanec (1983), : denotes less accurate measurements and n in the last column denotes the number of individual observations.

Table II  
Photometric observations of  $\theta$  CrB

JD-2440000	Phase	V	B	U	n
5843.347	0.974	4.155	4.021	3.502	12
.385		$\begin{matrix} +5 \\ 4.121 \\ - \end{matrix}$	$\begin{matrix} +35 \\ - \end{matrix}$	$\begin{matrix} +40 \\ - \end{matrix}$	6
5851.365	0.990	4.132	4.016	3.456	36
.472		$\begin{matrix} 11 \\ 4.068: \\ 11 \end{matrix}$	$\begin{matrix} 7 \\ 3.909: \\ 25 \end{matrix}$	$\begin{matrix} 16 \\ 3.424: \\ 80 \end{matrix}$	11
5853.354	0.994	4.151	-	3.501	13
.444		$\begin{matrix} 16 \\ 4.158 \\ 14 \end{matrix}$	$\begin{matrix} 8 \\ 4.016 \end{matrix}$	$\begin{matrix} 11 \\ 3.450 \\ 1 \end{matrix}$	12
5858.403	0.003	4.097	4.025	3.478	19
5879.382	0.044	-	$\begin{matrix} 7 \\ 4.016 \\ 4 \end{matrix}$	$\begin{matrix} 6 \\ 3.465 \\ 10 \end{matrix}$	14
5940.317	0.164	4.209	-	-	6
5941.326	0.166	$\begin{matrix} 20 \\ 4.132 \\ 6 \end{matrix}$	$\begin{matrix} 7 \\ 4.017 \end{matrix}$	$\begin{matrix} 3 \\ 3.467 \end{matrix}$	20
6176.443	0.626	4.136	4.022	3.466	21
6177.429	0.628	$\begin{matrix} 4 \\ 4.120 \\ 3 \end{matrix}$	$\begin{matrix} 2 \\ 4.016 \\ 2 \end{matrix}$	$\begin{matrix} 2 \\ 3.460 \\ 4 \end{matrix}$	24
6178.431	0.630	4.137	4.013	3.455	23
6182.388	0.638	$\begin{matrix} 3 \\ 4.174: \\ 3 \end{matrix}$	$\begin{matrix} 2 \\ 4.004 \\ 8 \end{matrix}$	$\begin{matrix} 3 \\ 3.478: \\ 21 \end{matrix}$	15
6194.498	0.661	4.144	4.004	3.461	15
6197.390	0.667	$\begin{matrix} 3 \\ 4.141 \\ 4 \end{matrix}$	$\begin{matrix} 4 \\ 4.012 \\ 5 \end{matrix}$	$\begin{matrix} 4 \\ 3.453 \\ 9 \end{matrix}$	25
6210.444	0.693	4.127	4.009	3.464	20
6212.424	0.696	$\begin{matrix} 2 \\ 4.122 \\ 4 \end{matrix}$	$\begin{matrix} 2 \\ 4.012 \\ 7 \end{matrix}$	$\begin{matrix} 4 \\ 3.455 \\ 4 \end{matrix}$	24
6221.417	0.714	4.136	4.021	3.458	42
		$\begin{matrix} 1 \\ 4.136 \\ 1 \end{matrix}$	$\begin{matrix} 2 \\ 4.021 \\ 2 \end{matrix}$	$\begin{matrix} 6 \\ 3.458 \\ 6 \end{matrix}$	

JD-2440000	Phase	V	B	U	n
6224.384	0.720	4.135	4.017	3.466	17
		1	2	2	
6244.363	0.759	4.132	4.013	-	10
		4	9		
6247.374	0.765	4.134	4.011	3.458	34
		5	2	7	
6249.378	0.769	4.141	4.023	3.453	36
		2	3	4	
6251.377	0.773	4.127	4.025	3.458	38
		2	2	8	
6253.382	0.777	4.140	4.015	3.483	20
		1	2	9	
6280.344	0.829	4.131	4.018	3.458	33
		2	4	7	
6290.333	0.849	4.134	4.029	3.469	38
		1	3	6	
6292.339	0.853	4.132	4.030	3.499:	23
		1	7	14	
6293.326	0.855	4.140	4.042	3.482	34
		3	4	7	
6297.331	0.863	4.137	4.004	3.448	30
		9	5	8	
6299.311	0.866	4.155	4.042	3.484:	18
		4	4		
6300.313	0.868	4.111	4.037	3.503	38
		6	8	3	
6308.322	0.884	4.146	4.023	3.455	25
		5	12	7	
6309.299	0.886	4.134	4.026	3.469	27
		7	8	6	
6311.299	0.890	4.129	4.029	3.463	36
		3	4	3	
6318.293	0.904	4.140	4.009	3.460	17
		4	13	7	
6327.326	0.921	4.160	4.038	3.481	27
		7	3	6	
6328.271	0.923	4.147	4.015	3.454	22
		6	2	15	
6334.257	0.935	4.137	4.028	3.479	29
		5	4	4	
6338.258	0.943	4.128	4.021	3.481	24
		2	2	4	
6340.264	0.947	4.127	4.028	3.482	21
		3	5	5	
6343.250	0.952	4.149	4.027	3.483	23
		14	3	4	
6363.214	0.992	4.156	4.057	-	9
		14	8		
6592.417	0.440	4.130	4.018	3.461	20
		1	6	4	
6605.388	0.466	4.130	4.004	3.467	23
		7	2	2	
6607.396	0.469	4.129	4.008	3.444	21
		10	4	4	

JD 2440000	Phase	V <sup>4</sup>	B	U	n
6609.384	0.473	4.096 10	4.006 15	3.462 7	22
6612.363	0.479	4.138 3	4.023 6	3.452 4	12
6614.382	0.483	4.105 6	4.000 2	3.465 2	22
6626.370	0.507	4.148 5	4.019 8	3.467 6	19
6646.361	0.546	4.140 5	4.017 5	3.441 4	17
6660.313	0.575	4.181 7	4.019 6	3.472 8	29
6672.299	0.599	4.142 13	-	-	3
6679.297	0.610	4.129: 27	4.029 15	3.481 10	12
6685.303	0.622	4.116 3	4.009 5	3.469 7	19
6690.282	0.632	4.130 6	4.016 9	3.464 5	23
6693.309	0.638	4.158 7	4.043: 44	3.494 10	9
6700.267	0.651	4.138 15	4.029 9	3.453 23	19
6705.250	0.661	4.138 20	4.036 15	3.510: 25	12
6708.250	0.667	4.139 15	4.037 5	3.444 12	12

The averaged photometric values of  $\theta$  CrB in different years are collected in Table III.

Table III  
Averaged photometric values of  $\theta$  CrB in 1984-86

Year	V	B-V	U-B	nights
1984	4.135 $\pm$ .008	-0.120 $\pm$ .006	-0.550 $\pm$ .007	8
1985	4.136 $\pm$ .002	-0.115 $\pm$ .002	-0.555 $\pm$ .002	33
1986	4.130 $\pm$ .004	-0.110 $\pm$ .003	-0.555 $\pm$ .004	17

From the measurements listed in the Table II it is clear that no decline of brightness of  $\theta$  CrB exceeded 0.06 mag in each colour was observed in 1984-86. Some different declines occurring in V and U colours in different heights are very similar to that observed by Fernandes et al. (1985) on July 22, 1984. Small changes in brightness of  $\theta$  CrB from night to night are - in our opinion - real and we agree with the result of Fernandes et al. that the eclipse of this hypothetical binary system in the interval of our observations did not occur.

J. PAPOUŠEK

Department of Astronomy Brno University  
Kotlářská 2 611 37 Brno, ČSSR

References:

- Fernandes, M., Kämper, B.-C., and Nelles, B. 1985, Inf.Bull.Var.Stars No. 2801  
 Harmanec, P., : 1983, Bull.Astr. Inst. Czech. 34, 324  
 Papoušek, J.,: 1974, Bull.Astr.Inst. Czech. 25, 152.