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IMPORTANT PARAMETERS OF FOUR SMALL-AMPLITUDE CEPHEIDS FROM uvby PHOTOMETRY

The small amplitude cepheids HR8084 (DT Cyg), HR8157, HR7165 (FF Aql) and HR690, were observed in the uvby photometric system with a four-channel spectrograph photometer attached to the 1.5 m telescope at San Pedro Martir Observatory (Mexico), from October 19 to 25, 1986. The data were duely reduced to the standard system by means of standard stars selected from Crawford and Barnes (1970). The results are listed in Table I. The uncertainties are 0.010, 0.004, 0.006 and 0.015 in V, (b-y), m1 and c1 respectively.

Table I, uvby observations of the program stars

V	b-y	m1	c1	HJD (2440000.+)
		HR8084		
5.875	.369	.222	.736	6724.722
5.909	.373	.228	.759	6729.663
		HR8157		
5.921	.334	.163	.696	6724.728
5.947	.337	.177	.700	6728.724
5.827	.305	.163	.813	6729.674
		HR7165		
5.547	.527	.224	.815	6728.588
		HR690		
6.234	.535	.189	.896	6723.830
6.229	.544	.192	.895	6724.839
6.271	.554	.209	.845	6726.875
6.321	.563	.218	.818	6727.858
6.335	.565	.222	.809	6728.832
----	.560	.209	.826	6729.835

The light and color curves of HR690 are shown in Figure 1.

To calculate atmospheric parameters, we have dereddened the mean values of the observations in Table I. The color excesses E(B-V), were calculated using the method of Dean at el. (1982) (see Arellano Ferro, 1984), and E(b-y)=0.73xE(B-V) was used (Crawford, 1975). The color excesses and the mean intrinsic photometric indices are given in Table II.

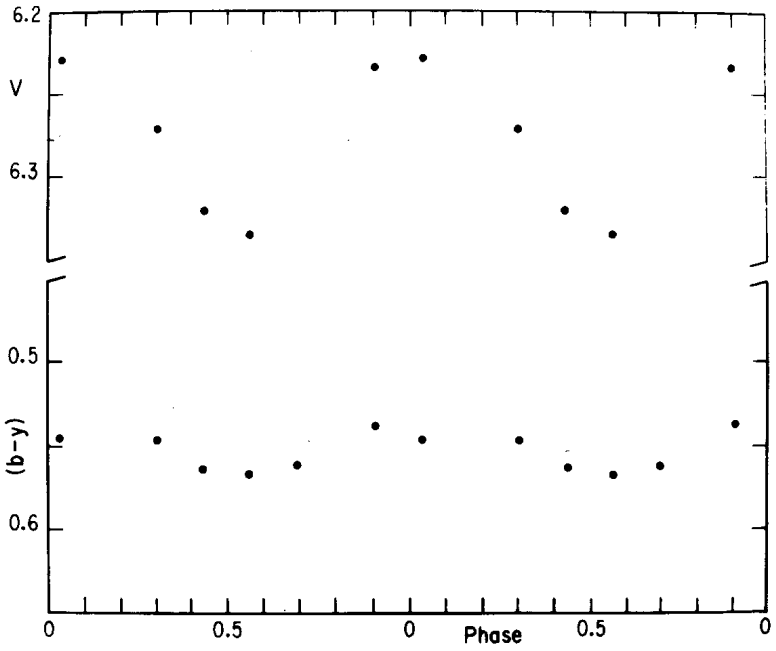

Figure 1.- Light and color variations of HR690 during October 1986. The observations have been phased with the ephemeris HJD_{max}=2444869.94+7.57E (Arellano Ferro 1984).

Table II. Mean intrinsic photometric indices

Star	$(b-y)_o$	$m1_o$	$c1_o$	E(B-V)
HR8084	.349	.232	.744	0.021
HR8157	.285	.181	.728	0.055
HR7165	.396	.266	.789	0.180
HR690	.395	.257	.816	0.216

Figure 2 is a $c1_o$ vs. $(b-y)_o$ diagram and it is sensitive to temperature and gravity. The positions of the program stars relative to the atmospheric models of Kurucz (1979) for [Fe/H]=0, indicate the T_e and log g values listed in Table III.

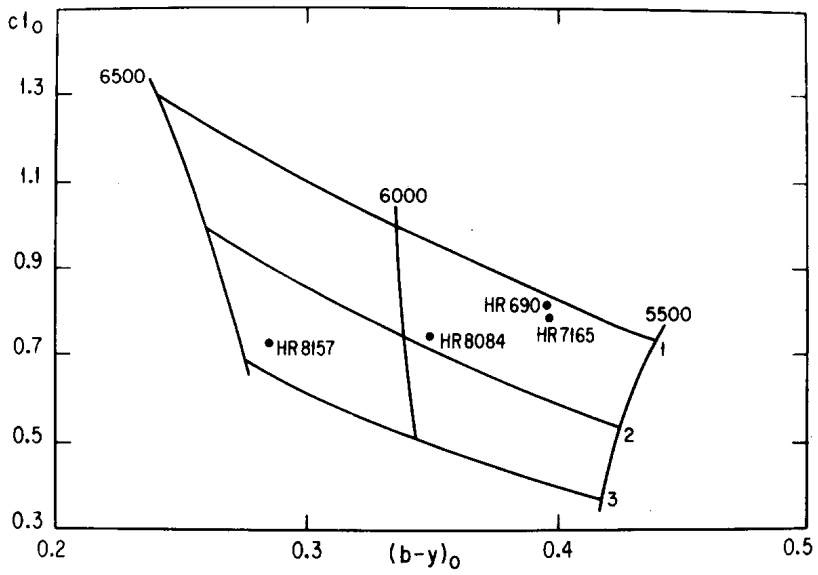

Figure 2.- Atmospheric models by Kurucz (1979) (solid lines) for log g = 1, 2, and 3, and for T_e = 5500, 6000 and 6500 K, all for [Fe/H]=0. The positions of four small-amplitude cepheids are indicated (dots) and allow estimates of log g and T_e for each star.

Table III. Effective temperature and gravity

Star	log g	T_e(uvby)	$T_e(H_\alpha)$
HR8084	2.0	5900	6195
HR8157	2.5	6400	5950
HR7165	1.0	5700	5990
HR690	1.0	5700	5741

The uncertainties in E(B-V) are likely to be smaller than .03 (Dean et al., 1982). Such uncertainties and the fact that $(b-y)_o$ in Table II has to be corrected to mean light, allowed us to estimate the uncertainties in T_e and log g to be smaller than 500 K and .5 respectively. The calculated effective temperatures agree very well with those determined from H_α profile fits (Arellano Ferro, 1984).

The absolute magnitudes M_v of the program stars were estimated using Antonello's (1985) calibration in terms of the bracket quantities [c1] and [m1]. With these values and T_e from Table III we can estimate the stellar radii.

Table IV. Absolute magnitudes and radii

Star	M_V	$M_V(W)$*	$R/R_\odot$	$R/R_\odot(W)$*
HR8084	-2.55	-3.39	28	37 ± 10
HR8157	-2.79	-3.14	26	34
HR7165	-3.57	-3.57	52	45.5 ± 6
HR690	-3.71	-4.07	52	58 ± 22 †

* $M_V(W)$ and R(W) are Wesselink values from Arellano Ferro (1984).

† Radius from Burki and Benz (1982).

M_V and radii values are listed in Table IV and are compared with the Wesselink values derived by Arellano Ferro (1984) and for HR690, with the radius found by Burki and Benz (1982). The agreement is satisfactory.

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