ΑΣΤΡΟΝΟΜΙΑ.— **Photoelectric Three - Color Observations of the Galactic Cepheids CD Cyg; X, Z, RR Lac and U Vul*,** *by G. Asteriadis*[1], *L. N. Mavridis*[1] *and A. Tsioumis*[1]. Ἀνεκοινώθη ὑπὸ τοῦ Ἀκαδημαϊκοῦ κ. Ἰ. Ξανθάκη.

1. INTRODUCTION

The determination of as complete and accurate light and color curves of cepheid variables as possible could be of considerable interest, for example, from the following points of view:

a) For a more thorough study of the relations existing between the different parameters characterizing the light and color curves and the period, as well as of the behaviour of the cepheids in the two-color diagrams. These relations could then be used for a better separation between the population I and population II cepheids in the disk of the Galaxy as well as for an eventual subdivision of these two groups of cepheids into further sub-groups.

b) For a control of the stability of the periods and, after reobservation of the same stars at a later time, of the form of the light and color curves. This information could be of great value for the determination of the time scale of the cepheid phenomenon.

As a contribution to this way of approach an effort has been made by Bahner and Mavridis (1971) to determine as complete and accurate light and color curves (B, V) as possible for the following 18 galactic cepheids with $2^d < P < 17^d$: R'T, RX, SY Aur; RW Cam; SU Cas, VZ, CD Cyg; V, X, Y, Z, RR, BG Lac; RS Ori; SV, AW Per; U Vul and TU Cas (the cepheid shows beat phenomena). The observations have been obtained in 1956 - 1959 with the 72-cm reflector of the Landessternwarte Heidelberg - Königstuhl (f/17) and the results obtained for the cepheids TU Cas; CD Cyg; X, Z, RR Lac and U Vul, have been published already (Bahner and Mavridis 1971).

In the year 1967 a new Astrophysical Observatory, the Stepha-

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* Γ. ΑΣΤΕΡΙΑΔΟΥ - Λ. Ν. ΜΑΥΡΙΔΟΥ - Α. ΤΣΙΟΥΜΗ, **Φωτοηλεκτρικαὶ παρατηρήσεις εἰς τρία χρώματα τῶν γαλαξιακῶν κηφειδῶν CD Cyg, X, Z, RR Lac καὶ U Vul.**

1. Department of Geodetic Astronomy, University of Thessaloniki, Greece.

nion Observatory, located in Peloponnese ($\lambda = -22^0\ 49'\ 44''$, $\varphi = +37^0\ 45'\ 15''$, H = 800 m above see level) was established in Greece. This observatory included among others a 38-cm Cassegrain reflector (f/21) belonging to the Hamburg Observatory and being used jointly by Dr. Heinz Neckel and his collaborators on the one hand and the staff of the Department of Geodetic Astronomy, University of Thessaloniki on the other hand. This telescope was transferred back to Hamburg in September 1970 and was replaced in June 1971 by a 30-inch Cassegrain reflector (f/13.5) with asymmetric mount constructed by Astro Mechanics Inc. and belonging to the Department of Geodetic Astronomy, University of Thessaloniki.

One of the main observational programs carried out with the 38-cm reflector mentioned above was the redetermination of complete and accurate light and color curves for some of the galactic cepheids observed by Bahner and Mavridis in Heidelberg with the aim of checking for eventual changes in the form of their light and color curves during the time interval elapsed between the two observational series. In addition, in order to get more information concerning the behaviour of these cepheids in the two-color diagram, the Stephanion observations have been carried out in the three colors of the international U, B, V system rather than only in two colors (B, V) as in Heidelberg.

In the second and third section of this paper a description is given of the observations carried out at Stephanion as well as of the methods used for their reduction outside the Earth's atmosphere. In the fourth section the transformation of our instrumental system to the international U, B, V system as well as the relation of the same system to the cepheid photometric system of Bahner and Mavridis (1971) and Mitchell et al. (1964) is discussed. In the fifth section the light and color curves obtained at Stephanion for the cepheids CD Cyg; X, Z, RR Lac and U Vul are given.

These data were used in the sixth section for the determination of some characteristic parameters of the five cepheids observed as well as for a discussion of the behaviour of these cepheids in the (U-B)/(B-V) diagram. The comparison of the light and color curves obtained at Stephanion for these cepheids with the corresponding curves obtained in Heidelberg has been given elsewhere (Asteriadis et al. 1974).

2. OBSERVATIONS

The observations described here have been obtained in the time interval April 1967 - August 1970 with the 38-cm reflector at the Stephanion Observatory mentioned above.

The photometer mounted at the Cassegrain focus, used during the time interval April 1967 - April 1970 a refrigerated EMI 9502 SA photomultiplier. This photomultiplier was replaced in May 1970 with an unrefrigerated EMI 9502 SA photomultiplier. During the entire observing period 1967 - 1970 the photometer was fitted with the Schott filters UG 2, 2 mm for the U, GG 13, 2 mm + BG 12, 1 mm for the B and OG 4, 1.5 mm for V color.

The photocurrent was measured by means of a DC amplifier (constructed by K. Rakosch) and a strip chart recorder. The observations were carried out mostly with a diaphragm of 35 seconds of arc in diameter.

In order to increase the accuracy and at the same time make the present observations comparable with the observations carried out in Heidelberg the same differential method has been used throughout the measurements as in Heidelberg. Close to each variable V two comparison stars A, B (the same as in Heidelberg) were selected and a symmetrical measuring sequence A u, b, v V v, b u, u, b, v B v, b, u, u, b, v V v, b, u, u, b, v A v, b, u was adopted which within 45 minutes gives two essentially independent differences V - A, V - B for the same instant and a difference A - B of half weight both in v and (b - v), (u - b), where v, b, u are the visual, blue and ultraviolet magnitudes in our instrumental system. Many of the nights used were not photometric, and the A - B values served as a check against gross errors. On some nights more than one observation of the same cepheid was made. In these cases only one of the comparison stars was usually measured during the additional observations.

3. REDUCTIONS

A detailed description of the method used for the reductions of the present observations will be given elsewhere. Therefore, here we shall confine ourselves in a few brief remarks.

The differences in air mass between variable and comparison stars were always quite small. The v magnitudes were reduced assuming that the second order term in the v extinction coefficient is zero. The mean errors for one observation of a comparison pair v difference are contained for the five cepheids considered here between $0^m.014$ and $0^m.023$.

For the (b - v) and (u - b) colors, the observations were reduced with the relations :

$$\Delta(b-v)_o = \Delta(b-v)\,x - k''_{b-v}X \quad \Delta(b-v)_o \approx \Delta(b-v)\,x\,[1 - k''_{b-v}X], \quad (1)$$

$$\Delta(u-b)_o = \Delta(u-b)\,x - k''_{u-b}X \quad \Delta(u-b)_o \approx \Delta(u-b)\,x\,[1 - k''_{u-b}X], \quad (2)$$

where X is the air mass. The second order coefficients k''_{b-v} and k''_{u-b} were determined for each night using all the comparison star observations. The resulting values were between $0^m.00$ and $-0^m.08$ for k''_{b-v} and $+0^m.04$ and $+0^m.12$ for k''_{u-b}. The mean errors for one observation of a comparison pair color difference are contained for the five cepheids considered here between $0^m.008$ and $0^m.022$ in (b - v) and $0^m.03$ and $0^m.06$ in (u - b).

No observation showing reasonable deflections was excluded. If the deviation from the mean comparison star difference was more than $0^m.04$ or the difference between the symmetrical halves of a cepheid observation surpassed $0^m.025$ the observation was marked uncertain. These limits were used for v and (b - v). The corresponding limits for (u - b) were taken correspondingly equal to $0^m.065$ and $0^m.04$.

4. PHOTOMETRIC SYSTEM

On a few good nights the comparison stars were observed together with stars which have high weight in Table 9 of Johnson et al. (1966). The stars representing the U, B, V system cover an adequate range in color and position in the sky. From these observations the transformation of our instrumental system to the international U, B, V system was found. This transformation was determined for the year 1967 and the relations thus found

$$V = v_o + 2.484 - 0.048\,(b-v)_o\,, \quad (3)$$
$$\pm 0.029 \pm 0.005$$

$$B - V = +1.104 + 0.990\,(b - v)_o\,, \qquad (4)$$
$$\pm 0.035 \pm 0.026$$

$$U - B = -1.800 + 1.033\,(u - b)_o\,, \qquad (5)$$
$$\pm 0.047 \pm 0.001$$

were used for the entire period April 1967 - April 1970 during which the photometer was fitted with the first of EMI 9502 SA photomultipliers mentioned above (refrigerated photomultiplier).

The same transformation was also determined after the replacement of this photomultiplier with the unrefrigerated EMI 9502 SA photomultiplier (May 1970) and the relations thus found:

$$V = v_o + 1.549 - 0.049\,(b - v)_o\,, \qquad (6)$$
$$\pm 0.010 \pm 0.004$$

$$B - V = +1.257 + 0.979\,(b - v)_o\,, \qquad (7)$$
$$\pm 0.013 \pm 0.010$$

$$U - B = -1.800 + 1.145\,(u - b)_o\,, \qquad (8)$$
$$\pm 0.015 \pm 0.011$$

were used for the rest of the observing period (May - August 1970).

In relations (3) - (8) v_o, $(b - v)_o$, and $(u - b)_o$ are the magnitudes and colors outside the Earth's atmosphere, while the errors of the coefficients given are mean square errors.

Furthermore a comparison of our photometric system to the systems of Bahner and Mavridis (1971) and Mitchell et al. (1964) has been carried out.

To this purpose one has first determined the phase shifts ΔP which have to be applied to the V - light curves given by Mitchell et al. and the present authors, because of an eventual inaccuracy of the elements (period and epoch) used, in order to bring them into agreement with the corresponding curves given by Bahner and Mavridis. These ΔP values were obtained with the help of the method of Herztsprung (1919). The results found are given in Table I where $\overline{JD}_M$, $\overline{JD}_H$, and $\overline{JD}_S$ represent respectively the mean Julian Dates for the observations by Mitchell et al., Bahner and Mavridis and the present authors.

TABLE I.

Phase shifts between the observations by Mitchell et al. and the present authors on the one hand and the observations by Bahner and Mavridis (1971) on the other hand

Cepheid	Period	Observations by Mitchell et al. and Bahner and Mavridis		Observations by the present authors and Bahner - Mavridis	
		$\overline{JD}_M - \overline{JD}_H$	ΔP	$\overline{JD}_S - \overline{JD}_H$	ΔP
X Lac	$5^d.45$	$+890^d.913$	$+0^P.007$	$+4432^d.049$	$+0^P.016$
RR Lac	6 .42	1028 .436	+0 .003	4614 .602	−0 .006
U Vul	7 .99	763 .148	+0 .006	4204 .953	+0 .001
Z Lac	10 .89	920 .839	+0 .003	4462 .891	+0 .004
CD Cyg	17 .07	776 .246	−0 .003	4363 .570	−0 .017

The ΔP shifts given in Table I were then applied to the corresponding light and color curves and at this stage a detailed comparison of the three photometric systems has been carried out. Following transformations were thus found :

$$V_S = +0.054 + 0.987\ V_H + 0.069\ (B-V)_H\ , \qquad (9)$$
$$\pm 0.014 \quad \pm 0.002 \quad \pm 0.004$$

$$(B-V)_S = -0.022 + 0.990\ (B-V)_H\ , \qquad (10)$$
$$\pm 0.006 \quad \pm 0.005$$

$$V_M = +0.030 + 0.995\ V_H + 0.036\ (B-V)_H\ , \qquad (11)$$
$$\pm 0.027 \quad \pm 0.003 \quad \pm 0.009$$

$$(B-V)_M = +0.018 + 0.970\ (B-V)_H\ , \qquad (12)$$
$$\pm 0.006 \quad \pm 0.005$$

$$V_M = -0.015 + 1.007\ V_S - 0.029\ (B-V)_S\ , \qquad (13)$$
$$\pm 0.029 \quad \pm 0.003 \quad \pm 0.009$$

$$(B-V)_M = +0.038 + 0.974\ (B-V)_S\ , \qquad (14)$$
$$\pm 0.015 \quad \pm 0.013$$

$$(U-B)_M = -0.010 + 0.899\ (U-B)_S + 0.172\ (B-V)_S\ , \qquad (15)$$
$$\pm 0.031 \quad \pm 0.063 \quad \pm 0.064$$

In equations (9) - (15), V_M, $(B-V)_M$, $(U-B)_M$, V_H, $(B-V)_H$, and V_S, $(B-V)_S$, $(U-B)_S$ represent respectively the magnitudes and colors in the systems of Mitchell et al., Bahner and Mavridis and the present authors, while the errors of the coefficients given are mean square errors.

5. RESULTS

The results obtained for the five cepheids considered here are given in Table II. The successive columns give the Heliocentric Julian Date, the phase computed with the help of the epochs and periods given in Kukarkin et al. (1969), the V magnitude and the (B - V), (U - B), colors. A colon indicates that the value given is of lower weight. The corresponding light and color curves are given in Figures 1 - 5. Open circles represent values of lower weight. As a consequence of the differential method used the light and color curves obtained for each variable relative to each comparison star are better defined than the magnitudes and colors of the comparison stars in a common system or this system in the U, B, V frame.

It should be noted that the same instrumentation (telescope + photometer) was used during the same period of time by Neckel in order to carry out two-color (B, V) photoelectric photometry of BD M-type stars located along the galactic equator. Neckel has made independent determination of his photometric system. A comparison of the results obtained by Neckel (1974) with the results given above shows that Neckel's photometric systems for the years 1967 and 1970 coincide with our systems for the same years given by relation (3) - (5) and (6) - (8) correspondingly. The photometric system given by Neckel for the year 1969 on the contrary differs slightly from the system given by him and by us for the year 1967. As Neckel's paper appeared after the completion of our calculations and the publication of the paper by Asteriadis et al. (1974) we decided to keep unchanged the original reduction of our 1969 observations with the help of the transformation equations (6) - (8). Therefore, the values given in Table II and plotted in Figures 1 - 5 have been calculated with the help of these equations. For comparison Table IIa gives the values of V, and (B - V) corresponding to our 1969 observations

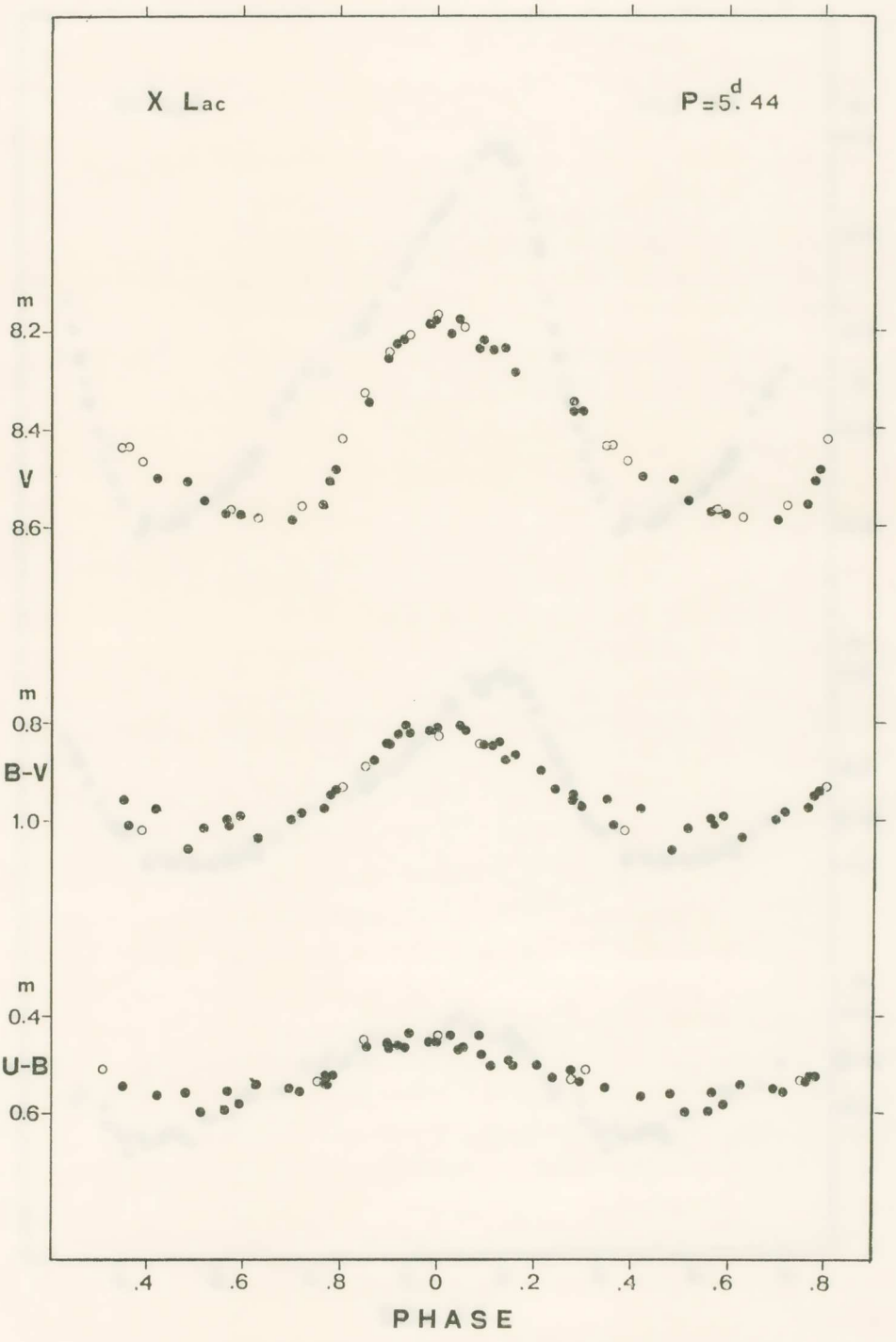

Fig. 1. Light and color curves of the cepheid X Lac.

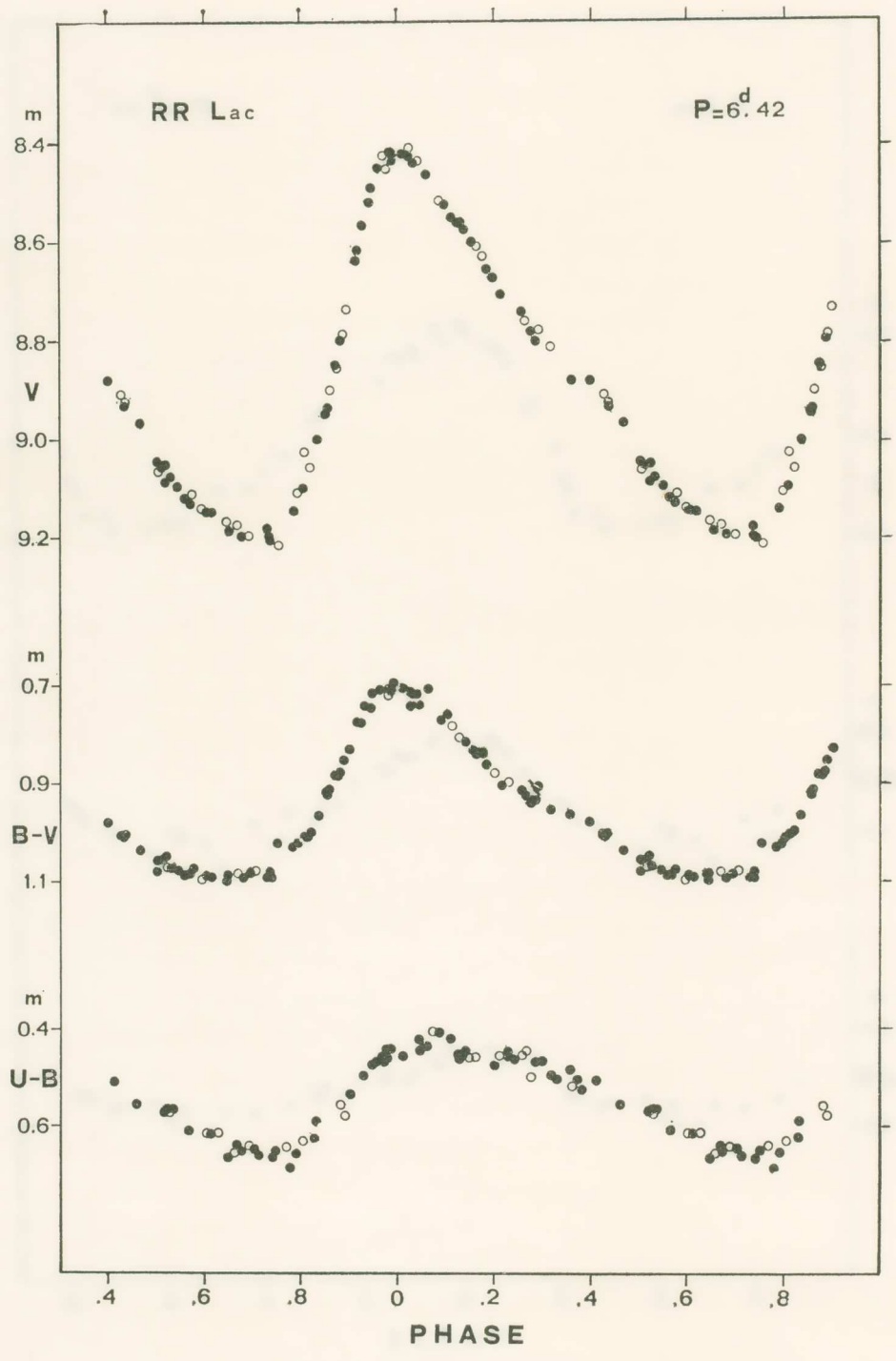

Fig. 2. Light and color curves of the cepheid RR Lac.

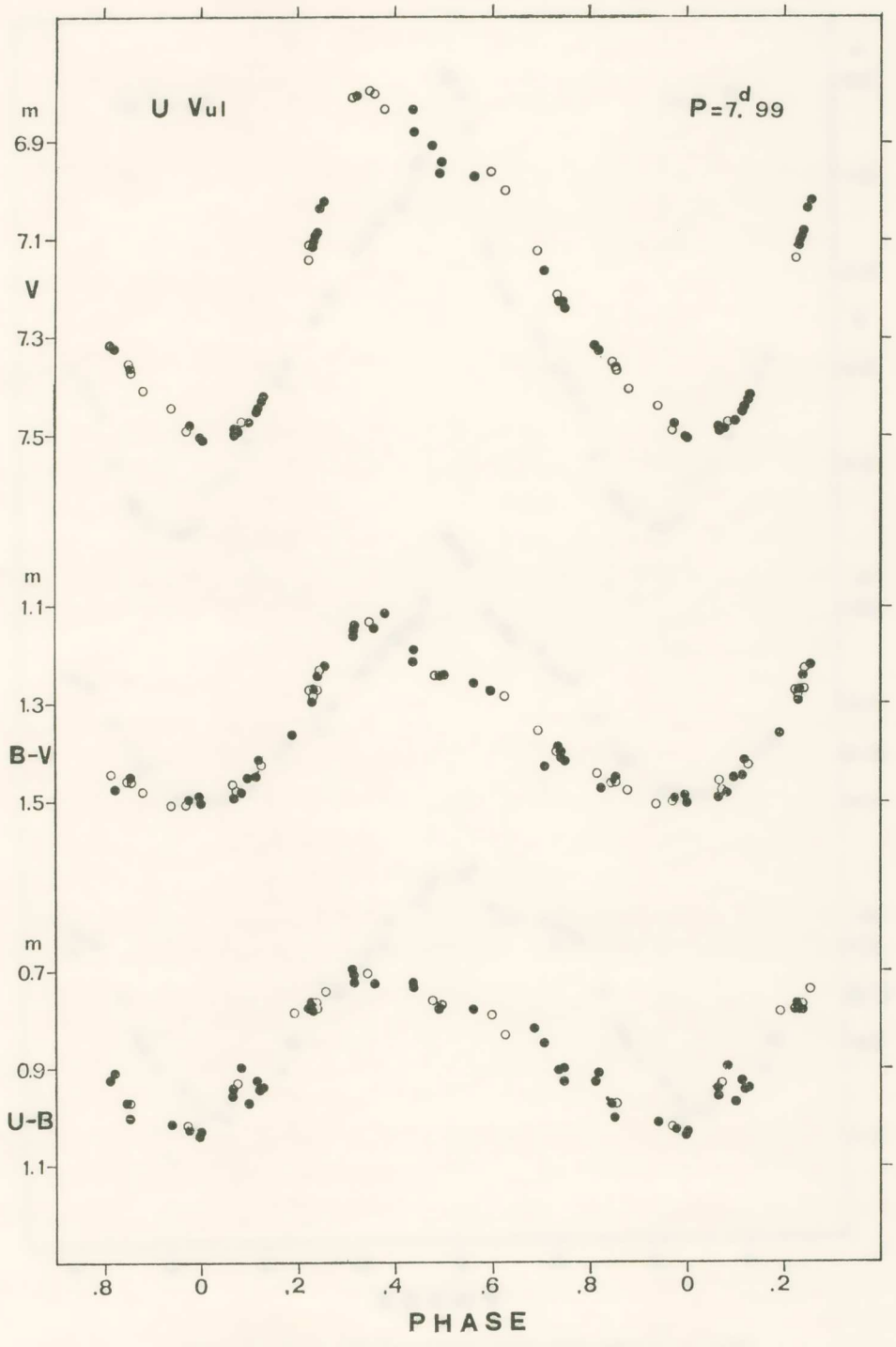

Fig. 3. Light and color curves of the cepheid U Vul.

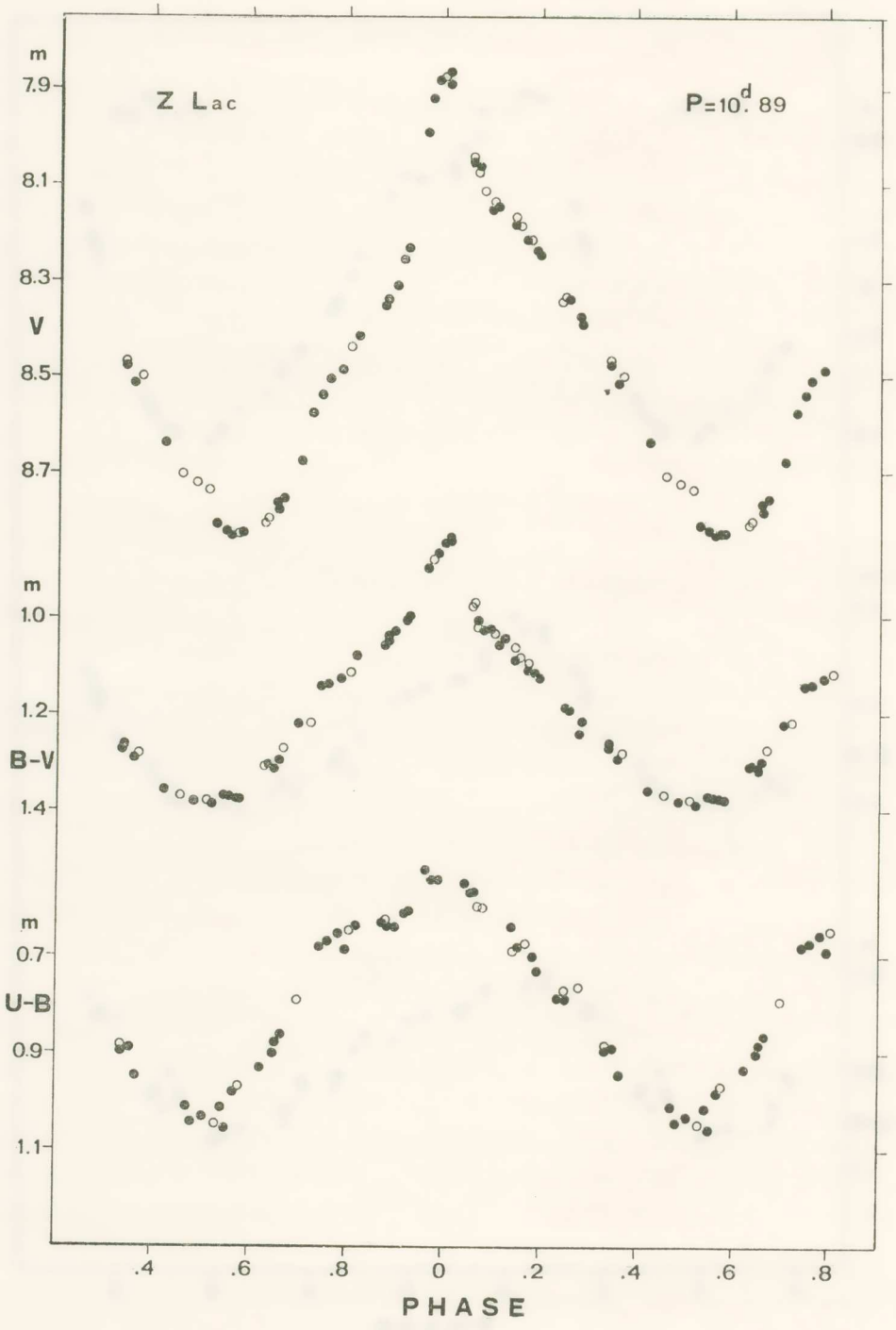

Fig. 4. Light and color curves of the cepheid Z Lac.

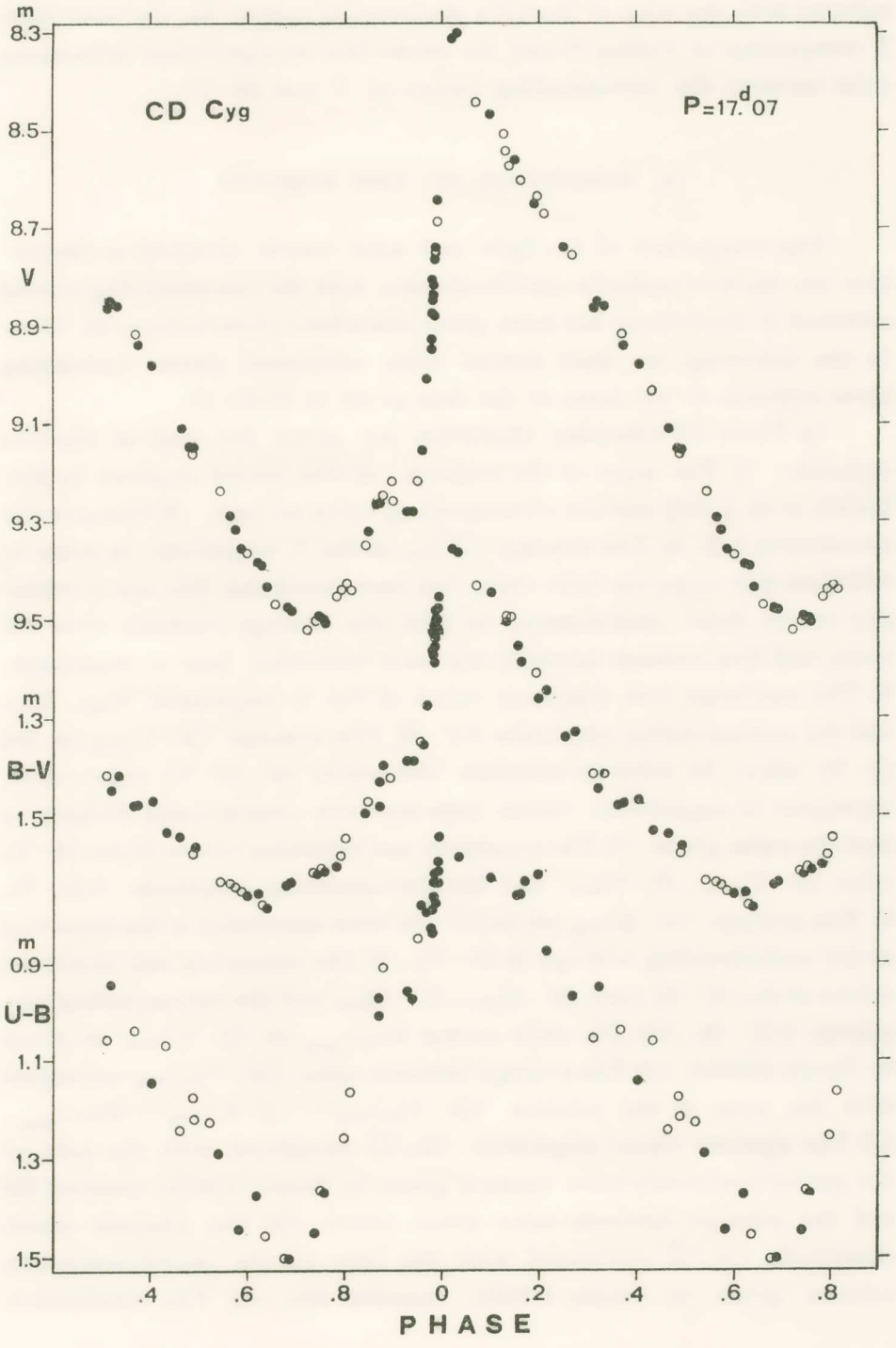

Fig. 5. Light and color curves of the cepheid CD Cyg.

reduced with the help of Neckel's photometric system for the year 1969. A comparison of Tables II and IIa shows that no significant differences exist between the corresponding values of V and (B - V).

6. DISCUSSION OF THE RESULTS

The comparison of the light and color curves obtained at Stephanion for the five cepheids considered here with the corresponding curves obtained in Heidelberg has been given elsewhere (Asteriadis et al. 1974). In the following we shall discuss some additional points concerning these cepheids on the basis of the data given in Table II.

In Table III following quantities are given for each of the five cepheids: 1) The name of the cepheid. 2) The period as given by Kukarkin et al. (1969) and the corresponding value of logP. 3) The galactic coordinates l, b. 4) The average $\langle V \rangle_{int}$ of the V magnitude. In order to calculate this value the light curve has been converted into one of intensity versus time, planimetered to find the average intensity over the cycle, and this average intensity has been converted into a magnitude. 5) The maximum and minimum values of the V magnitude V_{max}, V_{min} and the corresponding amplitude ΔV. 6) The average $\langle B - V \rangle_{mag}$ of the (B - V) color. In order to calculate this value the (B - V) color curve, expressed in magnitudes versus time has been planimetered directly to find the value given. 7) The maximum and minimum values of the (B - V) color $(B - V)_{max}$, $(B - V)_{min}$ and the corresponding amplitude $\Delta(B - V)$. 8) The average $\langle U - B \rangle_{mag}$ of the (U - B) color calculated in the same way as the corresponding average in (B - V). 9) The maximum and minimum values of the (U - B) color $(U - B)_{max}$, $(U - B)_{min}$ and the corresponding amplitude $\Delta(U - B)$. 10) The color excess $E_{\langle B-V \rangle_{mag}}$ in $\langle B - V \rangle_{mag}$ as given by Fernie (1967a). 11) The average intrinsic color $\langle (B - V)_o \rangle_{mag}$ calculated with the help of the relation $\langle (B - V)_o \rangle_{mag} = \langle B - V \rangle_{mag} - E_{\langle B-V \rangle_{mag}}$. 12) The absolute visual magnitude $\langle M_v \rangle_{int}^{(1)}$ calculated with the help of the period-luminosity-color relation given by Fernie (1967b, equation 22) and the average intrinsic color given above. 13) The absolute visual magnitude $\langle M_v \rangle_{int}^{(2)}$ calculated with the help of the period-luminosity relation given by Fernie (1967b, equation 25). 14) The heliocentric

distances $r^{(1)}$ and $r^{(2)}$ calculated in the usual way from the absolute visual magnitudes $\langle M_v \rangle^{(1)}_{int}$, $\langle M_v \rangle^{(2)}_{int}$ correspondingly, the average magnitude $\langle V \rangle_{int}$ and the color excess $E_{\langle B-V \rangle_{mag}}$ given above. The ratio of total to selective absorption has been assumed equal to 3.0. 15) The distance r sinb from the galactic plane calculated with the help of both

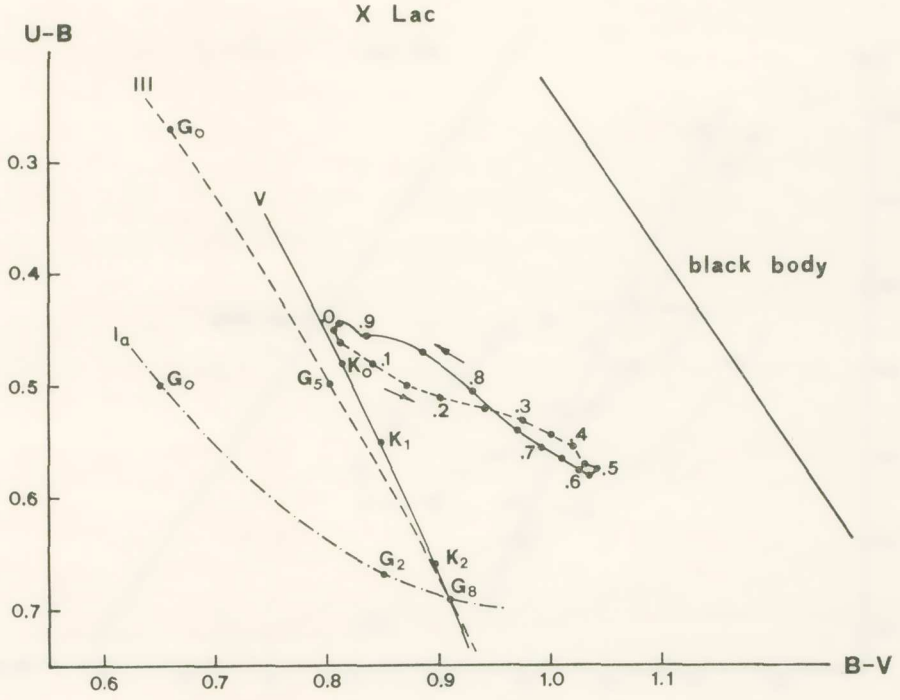

Fig. 6. (U - B) / (B - V) diagram of the cepheid X Lac.

values $r^{(1)}$ and $r^{(2)}$ of the heliocentric distance given above. The values $\langle M_v \rangle^{(2)}_{int}$, $r^{(2)}$ and $r^{(3)}$ sinb have been given here for comparison with the corresponding data given by Fernie (1968). 16) The radial velocity V_r taken from Kraft and Schmidt (1963). 17) The spectral type as given in Kukarkin et al. (1974).

It should be noted that many efforts have been made during recent years in order to determine the intrinsic $(B - V)_o$, $(U - B)_o$ colors of the galactic cepheid at maximum and minimum light (Fernie 1970, Maka-

renko 1971 and Nokolov 1967a, 1967b). Fernie, for example, gave the following relations

$$(B-V)_o^{max} = 0.297 + 0.307\log P - 0.194\,\Delta V, \qquad (16)$$

$$(B-V)_o^{min} = 0.238 + 0.373\log P + 0.373\,\Delta V, \qquad (17)$$

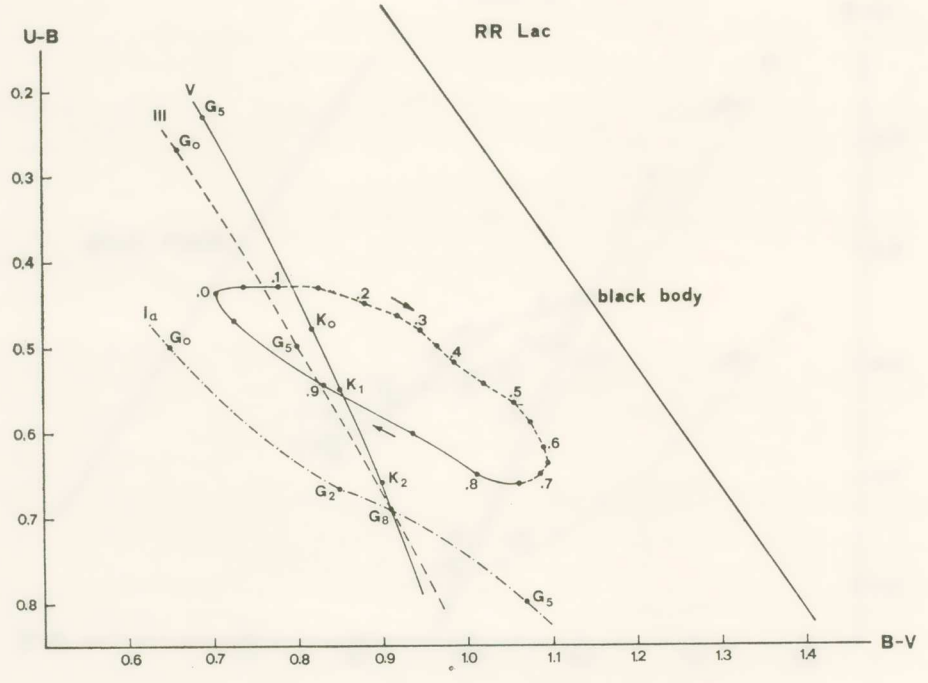

Fig. 7. (U - B) / (B - V) diagram of the cepheid RR Lac.

which give these colors as functions of the period and the amplitude ΔV. However, as the averages of the values of $(B-V)_o^{max}$ and $(B-V)_o^{min}$ calculated with the help of relations (16) and (17) do not differ significantly from the values of the average intrinsic colors $\langle (B-V)_o \rangle_{mag}$ given above, the later values have been used for the determination of the quantities given in Table III.

In Figures 6 - 10 the (U - B) / (B - V) diagrams are given for the five cepheids considered here. To this purpose mean color curves have been drawn in Figures 1 - 5 and the (B - V), (U - B) values have been read

every $0^{p}.05$ on these curves. In the same diagrams the position of the intrinsic lines corresponding to the luminosity classes Ia, III and V and the black body as given by Golay (1971) is shown. In the (U - B)/(B - V) two - color tracks of each cepheid the continuous line represents the observations on the rising branch of the corresponding (U - B) curve

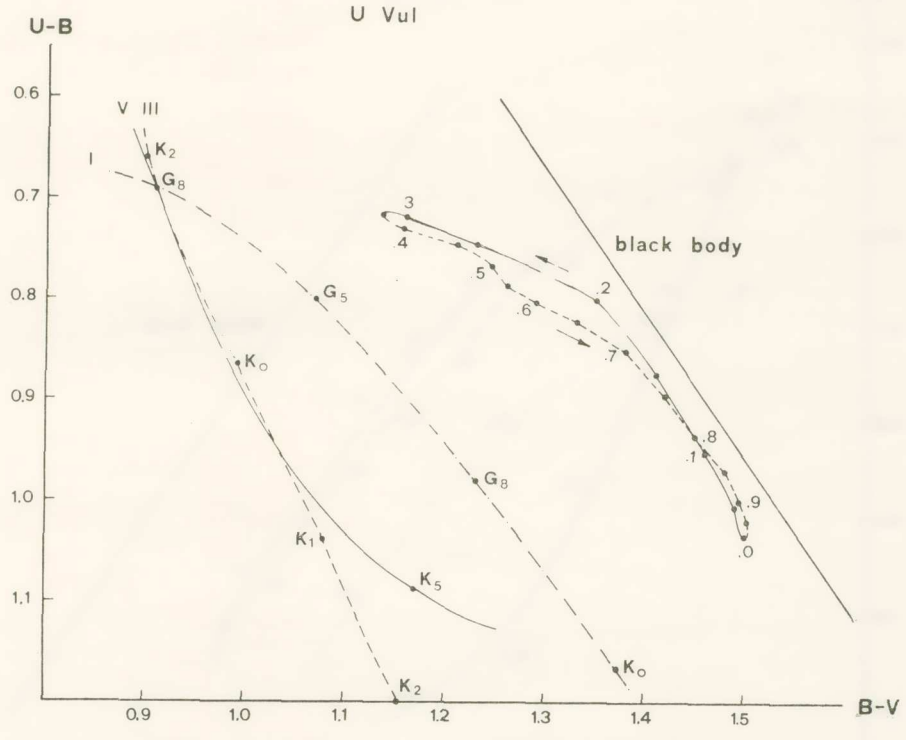

Fig. 8. (U - B)/(B - V) diagram of the cepheid U Vul.

and the dashed line those on the descending branch. The numbers along these tracks give the phases on the corresponding (U - B) curve.

From these diagrams following conclusions can be drawn : a) The two - color tracks of the cepheids X Lac, U Vul, Z Lac and CD Cyg form rather flat loops which are slightly curved and present one intersection for all these stars, but the star CD Cyg for which the corresponding loop shows three intersections. Furthermore, the part of the track corresponding to the rising branch of the (U - B) curve (continuous line)

is at its greater extent higher in the diagram than the part corresponding to the descending branch (dashed line). Kwee (1968) has noticed similar behaviour for four classical cepheids studied by him. However, his remark that the intersection in the track seems to be near the minimum of the (U - B) curve does not seem to be verified in all cases studied by

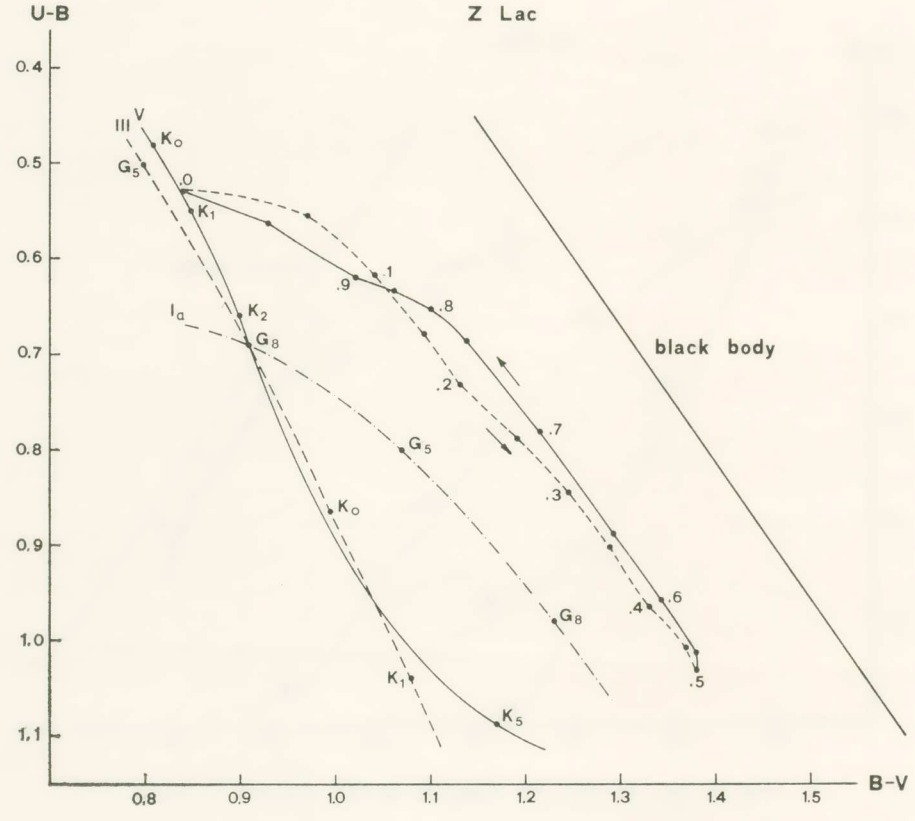

Fig. 9. (U - B)/(B - V) diagram of the cepheid Z Lac.

us. b) The two - color track for the cepheid RR Lac is fairly open, does not present any intersection and its part corresponding to the rising branch of the (U - B) curve is lower than the part corresponding to the descending branch. Kwee (1968) found that the two - color tracks for the population II cepheids are generally more open than those for the classical cepheids. In the two - color tracks of the population II cepheids contained in his Fig. 7, however, the part of the track corresponding

to the rising branch of the (U - B) - curve lies higher than the part corresponding to the descending branch.

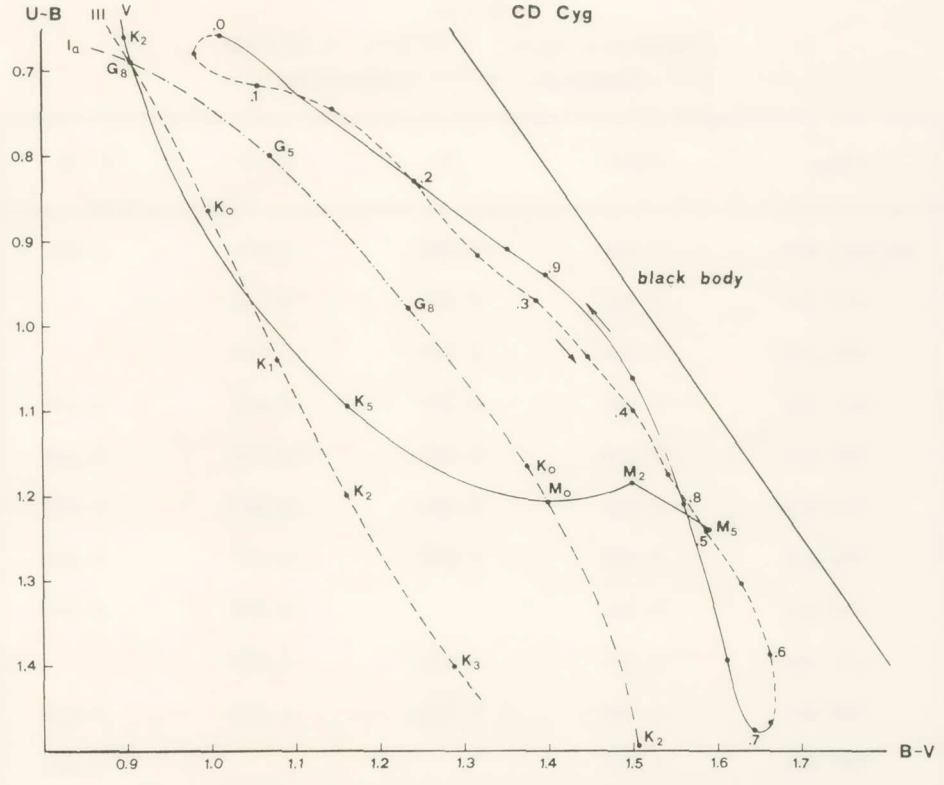

Fig. 10. (U - B) / (B - V) diagram of the cepheid CD Cyg.

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Part of the observations discussed here have been carried out by Messrs. Th. Contoroupis and P. Ivrissimtsis.

TABLE II

The Cepheid Photometry

X Lac

Comparison Stars : + 56° 2872, + 55° 2809

E 2436814.00, P^{-1} 0.1836527054 d^{-1}

JD_{Hel}	Phase	V	B - V	U - B
2439681.509	0.625	8.582:	1.036	0.537
682.457	0.800	8.420:	0.932:	
685.470	0.353	8.435:	1.011	
689.461	0.086	8.236	0.845:	0.441
690.479	0.273	8.364	0.949	0.509
704.470	0.843	8.324:	0.887:	0.451:
705 461	0.025	8.208	0.837	0.441
706.455	0.207		0.899	0.503
707.416	0.384	8.465:	1.023:	
708.407	0.566	8.562:	1.008	0.554
709.415	0.751			0.536:
710.443	0.940	8.209:	0.821	0.435
712.448	0.308			0.511:
713.384	0.480	8.507	1.057	0.557
2440777.454	0.899	8.241:	0.845	0.467
788.336	0.898	8.253	0.842	0.455
788.426	0.914	8.228	0.822	0.460
788.509	0.929	8.219	0.804	0.464
789.392	0.091	8.220	0.847	0.478
789.505	0.112	8.237	0.844	0.501

Table II (continued)

X Lac (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440790.392	0.275	8.348	0.959	0.532:
790.503	0.296	8.365	0.973	0.536
793.555	0.856	8.344	0.874	0.462
794.332	0.999	8.169:	0.828:	0.441:
797.381	0.559	8.571	0.997	0.596
797.534	0.587	8.574	0.993	0.582
798.473	0.759	8.555	0.974	0.540
798.546	0.773	8.509	0.949	0.522
800.525	0.136	8.232	0.874	0.489
803.566	0.695	8.588	1.000	0.551
805.455	0.042	8.176	0.809	0.470
805.516	0.053	8.191:	0.816	0.464
806.526	0.238		0.936	0.526
809.385	0.763			0.542
811.528	0.157	8.284	0.865	0.501
812.564	0.347	8.432:	0.958	0.544
813.466	0.513	8.548	1.018	0.599
814.573	0.716	8.558:	0.988	0.554
818.398	0.418	8.500	0.971	0.563
820.387	0.784	8.481	0.937	0.523
821.453	0.980	8.185	0.818	0.456
821.538	0.995	8.179	0.808	0.454

Table II (continued)

RR Lac

Comparison Stars: + 55° 2791, + 55° 2796

E = 2433537.37, P^{-1} = 0.1558557 d^{-1}

JD_{Hel}	Phase	V	B - V	U - B
2439707.481	0.648	9.185	1.087	0.652
708.491	0.804	9.026:	1.008	
711.494	0.272	8.780	0.941	0.505
712.492	0.428	8.927	1.005:	0.570:
713.429	0.574	9.109:	1.074	0.650
714.450	0.733	9.199	1.083	0.589
715.396	0.881	8.795	0.874	0.460
716.407	0.038		0.713:	0.445
2440407.529	0.753	9.214:	1.019	
408.464	0.899	8.736:	0.829	
412.427	0.517	9.049	1.071:	
415.483	0.993	8.434	0.700	
417.399	0.292	8.780:	0.906	
421.421	0.919	8.617	0.773	
421.511	0.933	8.566	0.741	
422.502	0.087	8.516:	0.771	
424.493	0.397	8.880	0.977	
444.399	0.500	9.043	1.079	
444.537	0.521	9.084	1.047	
2440767.466	0.852	8.939	0.924	0.471
768.576	0.025	8.422	0.715	0.458
770.420	0.312	8.812:	0.956	0.510
772.545	0.643	9.166:	1.100	0.664
773.436	0.782	9.145	1.030	0.557:
777.556	0.424	8.909:	1.004	0.568
779.561	0.704		1.078:	0.630:

Table II (continued)

RR Lac (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440779.561	0.737	9.202	1.091	
780.446	0.875	8.853:	0.883	0.443
780.522	0.887	8.786:	0.854	0.441
781.414	0.026	8.407:	0.744	0.459
781.532	0.044	8.436:	0.739	0.459:
782.373	0.175	8.629:	0.840	0.500:
782.528	0.199	8.671	0.881:	0.471
783.540	0.357	8.878	0.966	0.555
784.465	0.501	9.063:	1.057	0.614:
784.531	0.511	9.052	1.055	0.615
788.381	0.111	8.548	0.784:	0.456:
788.468	0.125	8.559		0.454
788.557	0.139	8.573	0.816	0.466
789.347	0.262	8.759:	0.924	0.518:
789.476	0.282	8.803	0.935	0.527
790.437	0.432	8.924:	1.007:	0.567
795.458	0.214	8.704	0.907	0.494
795.547	0.228		0.897:	0.504
797.473	0.528	9.079	1.072	0.616:
797.578	0.545	9.096	1.079	0.666
798.362	0.667	9.173:	1.081:	0.643:
798.428	0.677	9.198	1.091	0.684
798.515	0.691	9.195:	1.083	0.655
799.423	0.832	9.000	0.963	0.495
799.546	0.852	8.946	0.918	0.469
800.320	0.972	8.423:	0.713	0.408:
800.361	0.979	8.451:	0.719:	
800.399	0.985	8.418	0.707	0.409

Table II (continued)

RR Lac (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440800.439	0.991	8.415	0.695	
800.563	0.010	8.419	0.706	0.419
803.476	0.466	8.967	1.035	0.608
804.301	0.593	9.140:	1.095:	0.639:
804.371	0.603	9.149	1.087	0.647
804.430	0.613	9.149	1.090	0.661
805.572	0.791	9.108:	1.022	0.577:
806.356	0.913	8.637	0.777	0.454
806.584	0.948	8.490	0.716	0.445
807.311	0.062	8.462	0.707	0.458:
807.560	0.101	8.522	0.758	0.474
809.573	0.414			0.571
810.500	0.559	9.119	1.087	0.654:
810.559	0.568	9.131	1.086	0.638
811.579	0.727	9.179	1.092	0.626
812.428	0.859	8.900:	0.911	0.461
812.498	0.870	8.849	0.883	0.468
813.563	0.036	8.440	0.719	0.455
814.327	0.155	8.600	0.831	0.454:
814.367	0.162	8.607:	0.840	0.445:
814.513	0.184	8.652	0.861	0.470
818.479	0.802	9.099	1.010	0.534
818.576	0.818	9.060:	0.999	
819.379	0.943	8.518	0.746	0.422
819.504	0.962	8.449	0.709	0.434
820.575	0.129	8.559:	0.808:	0.446
821.392	0.256	8.740	0.914	0.484

Table II (continued)

U Vul

Comparison Stars: +20° 4210, +20° 4215

E = 2420141.642, P^{-1} = 0.12514586 d^{-1}

JD_{Hel}	Phase	V	B - V	U - B
2439668.499	0.705	7.164	1.433	0.848
679.495	0.081	7.474:	1.486	0.898
682.323	0.435	6.838	1.216	0.728
685.329	0.811	7.319	1.447:	0.925
687.365	0.066	7.490	1.495	0.958
689.337	0.313	6.813:	1.162	0.697
690.326	0.437	6.882	1.188	0.733
703.399	0.073	7.496	1.478:	0.928:
704.315	0.188		1.361	0.784:
705.312	0.312		1.149	0.711
707.301	0.561	6.975	1.261	0.780
708.301	0.686			0.818
709.357	0.819	7.325	1.474	0.907
710.315	0.938	7.444:	1.510:	1.015
711.333	0.066	7.495	1.462:	0.940
713.335	0.316	6.812	1.154	0.725
716.330	0.691	7.126:	1.358:	
2440017.496	0.381	6.835:	1.155	
021.485	0.880	7.409:	1.481:	
024.409	0.246	7.040:	1.233:	
119.329	0.125	7.421	1.428:	
703.478	0.229	7.110:	1.288:	0.767:
705.455	0.476	6.910	1.241:	0.762:
708.448	0.851	7.372:	1.463:	0.971:

Table II (continued)

U Vul (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440766.473	0.112	7.455	1.450	0.926
767.414	0.230	7.115	1.271	0.772
768.334	0.345	6.798:	1.133:	0.704:
770.345	0.597	6.965:	1.274	0.790:
771.550	0.748	7.245	1.419	0.931
772.338	0.846	7.353:	1.461:	0.973
773.320	0.969	7.494:	1.505:	1.021:
773.549	0.998	7.505	1.489	1.034
777.524	0.495	6.946	1.243	0.769
779.514	0.744	7.227	1.417	0.901
781.356	0.975	7.480	1.499	1.026
782.552	0.124	7.431	1.423	0.941
783.334	0.222	7.143:	1.274:	0.776
783.445	0.236	7.097	1.270:	
784.415	0.358	6.803:	1.146	0.725
789.547	0.000	7.509	1.503	1.033
794.547	0.626	7.002:	1.289:	0.833:
799.570	0.254	7.021	1.225	0.742:
803.419	0.736	7.229	1.390	0.906
806.311	0.098	7.473	1.452	0.969
807.364	0.230	7.109	1.295	0.763
807.438	0.239	7.085	1.244	0.744
809.456	0.491	6.966	1.245	0.781
811.377	0.732	7.215:	1.400:	
812.328	0.851	7.366:	1.457	1.002
814.465	0.118	7.446	1.418	0.945

Table II (continued)

Z Lac

Comparison Stars : + 55° 2791, + 55° 2796

E = 2434575.780, P^{-1} = 0.091862541 d^{-1}

JD_{Hel}	Phase	V	B - V	U - B
2439707.489	0.412	8.638	1.356	
708.490	0.504	8.736:	1.378:	1.029
711.494	0.780	8.487	1.122	0.651
712.492	0.871	8.350	1.054	0.629
713.430	0.958	7.991	0.891	0.517
714.450	0.051	8.052	0.972:	0.567
715.396	0.138	8.185	1.088	0.635
716.407	0.231	8.346:		0.788
2440407.528	0.719	8.580	1.216:	
412.424	0.169	8.214:	1.094:	
415.483	0.450	8.703:	1.370:	
417.398	0.626	8.794:	1.302	
421.421	0.995	7.875:	0.840	
421.511	0.004	7.894	0.846	
422.438	0.089	8.155	1.022	
422.502	0.095	8.136:	1.032:	
424.493	0.278	8.393	1.213	
444.399	0.106	8.147	1.052	
444.536	0.119		1.043	
762.555	0.333	8.476	1.271	0.889:
767.548	0.792			0.687
768.487	0.878	8.339	1.046	0.636
770.401	0.054	8.043:	0.977:	0.569
770.532	0.066	8.075:	1.004	
771.351	0.141	8.165:	1.061:	0.689:
771.481	0.153	8.188:	1.079:	0.683
772.544	0.251	8.339	1.191	0.792
773.436	0.332	8.473:	1.266	0.894
777.392	0.696	8.675	1.219	0.792:

Table II (continued)

Z Lac (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440779.351	0.876		1.039	0.623:
780.391	0.971	7.920	0.879:	0.543
780.523	0.983	7.885	0.864	0.543
781.399	0.064	8.059	1.018:	0.599:
781.531	0.076	8.116:	1.024	0.598:
782.514	0.166	8.217	1.108	0.672:
783.391	0.247	8.337:	1.184	0.772:
784.533	0.352	8.515	1.289	0.891
789.567	0.814	8.415	1.076	0.638
790.437	0.894	8.311	1.024	0.639
794.576	0.274	8.378	1.239	0.762:
795.548	0.364	8.500:	1.280:	0.946
797.331	0.527	8.809	1.385	1.047:
797.473	0.541	8.822	1.369	1.012
797.566	0.549	8.828	1.370	1.053
798.357	0.622	8.806:	1.302:	0.929
800.302	0.800	8.441:	1.114:	0.644:
804.474	0.184	8.238	1.115	0.699
804.563	0.192	8.245	1.122	0.729
807.559	0.467			1.010
809.512	0.646	8.763	1.312	0.903
809.572	0.652	8.779	1.296	0.878
810.559	0.743	8.538	1.139	0.677
812.443	0.916	8.255	1.004	0.609
812.498	0.921	8.232	0.994	0.608
813.407	0.004	7.867	0.841	0.551
818.576	0.479	8.723:	1.372	1.040
819.505	0.564	8.826:	1.373	0.979
819.587	0.572	8.826	1.373	0.968:
820.574	0.663	8.752	1.270:	0.862
821.582	0.755	8.508	1.138	0.669

Table II (continued)

CD Cyg

Comparison Stars : + 33° 3734, + 33° 3716

E = 2436848.21, P^{-1} = 0.0585775725 d^{-1}

JD_{Hel}	Phase	V	B - V	U - B
2439681.439	0.964	9.010	1.274	0.793
682.385	0.019	8.311	0.953	
685.396	0.195	8.633:	1.262	0.717
687.422	0.314	8.849	1.447	0.946
689.394	0.430	9.040	1.531	1.065:
690.383	0.488	9.147	1.558	1.214:
704.385	0.308	8.865	1.415:	1.052:
705.392	0.367	8.937	1.476	1.035:
707.353	0.482	9.149		1.172:
708.351	0.540	9.233:	1.632:	1.290
711.381	0.718	9.522:		
714.299	0.889	9.219:	1.421:	
715.294	0.947	9.220:	1.349:	0.850:
2440412.351	0.779	9.453:	1.601	
412.510	0.788	9.440:	1.583:	
413.343	0.837	9.350:	1.494	
413.502	0.846	9.320	1.469:	
414.343	0.895	9.260:		
417.338	0.071	8.447:	1.032:	
418.344	0.130	8.543:	1.106	
418.487	0.138	8.573:	1.096:	
419.388	0.191	8.650	1.209:	
420.373	0.249	8.740	1.342	
422.384	0.366	8.915:	1.474	

Table II (continued)

CD Cyg (continued)

JD Hel	Phase	V	B - V	U - V
2440424.417	0.486	9.161:	1.573:	
443.336	0.594	9.366:	1.660	
444.356	0.653	9.471:		
2440705.586	0.956	9.159	1.352	0.782
708.498	0.126	8.510:	1.096:	
767.509	0.583	9.361	1.653:	1.445
768.420	0.636	9.435	1.686	1.458:
770.466	0.756	9.506	1.610	1.372
771.388	0.810	9.440:		1.165:
772.475	0.874	9.245:	1.396	0.913:
773.370	0.926	9.281	1.387	0.959
773.503	0.934	9.278	1.389	0.976
777.343	0.159	8.603:	1.187	0.732
781.470	0.401	8.978	1.467	1.146
782.463	0.459	9.111	1.539	1.243:
783.496	0.519			1.227:
784.354	0.570	9.317	1.643:	
789.438	0.868	9.263	1.432	1.009
791.326	0.978	8.877	1.189	0.770
791.357	0.980	8.848	1.158	0.721
791.390	0.982	8.815	1.140	0.732
791.426	0.984	8.765	1.121	0.739
791.459	0.986	8.739	1.101	0.716
791.504	0.989	8.688:	1.077	0.697

Table II (continued)

CD Cyg (continued)

JD_{Hel}	Phase	V	B - V	U - B
2440791.536	0.990	8.645	1.055	0.645
803.368	0.684	9.482	1.634	1.504
804.330	0.740	9.493	1.617	1.450
804.519	0.751	9.503	1.605:	1.367:
805.319	0.798	9.427:	1.546:	1.258:
806.467	0.865	9.263	1.479	0.973
808.322	0.974	8.950	1.172	0.791
808.355	0.976	8.928	1.159	0.829
808.403	0.978	8.882	1.133	0.840
808.436	0.980	8.839	1.126	0.732
808.476	0.983	8.823	1.109	0.778
808.523	0.986	8.750:	1.080	0.714
809.303	0.031	8.303	0.963	0.687
810.445	0.098	8.469	1.048	0.727
811.326	0.150	8.562	1.153	0.764
811.436	0.156			0.762
812.381	0.211	8.668:	1.244	0.878
813.336	0.267	8.756:	1.330	0.968
814.415	0.331	8.858	1.414	
818.329	0.560	9.287	1.637:	
819.316	0.618	9.386	1.658	1.376
819.437	0.625	9.390	1.681:	
820.325	0.677	9.474	1.639	1.504:
821.329	0.736	9.504:	1.616:	

TABLE IIa

The Cepheid Photometry (see text)

RR Lac

JD_{Hel}	Phase	V	B - V
2440407.529	0.753	9.215:	1.020
408.464	0.899	8.742:	0.834
412.427	0.517	9.049	1.071:
415.483	0.993	8.444	0.707
417.399	0.292	8.784:	0.909
421.421	0.919	8.625	0.779
421.511	0.933	8.575	0.748
422.502	0.087	8.524:	0.777
424.493	0.397	8.882	0.979
444.399	0.500	9.043	1.079
444.537	0.521	9.085	1.047

Z Lac

JD_{Hel}	Phase	V	B - V
2440407.528	0.719	8.576	1.213:
412.424	0.169	8.213:	1.093:
415.483	0.450	8.695:	1.364:
417.398	0.626	8.788:	1.297
421.421	0.995	7.881:	0.845
421.511	0.004	7.900	0.851
422.438	0.089	8.156	1.023
422.502	0.095	8.137:	1.033:
424.493	0.278	8.389	1.210
444.399	0.106	8.148	1.052
444.536	0.119		1.044

Table IIa (continued)

CD Cyg

JD_{Hel}	Phase	V	B - V
2440412.351	0.779	9.417:	1.574
412.510	0.788	9.405:	1.556:
413.343	0.837	9.317:	1.469
413.502	0.846	9.288	1.444:
414 343	0.895	9.231:	
417.338	0.071	8.426:	1.016:
418.344	0.130	8.520:	1.089
418.487	0.138	8.551:	1.079:
419.388	0.191	8 625	1.189:
420.373	0.249	8.711	1.320
422.384	0.366	8.883:	1.449
424.417	0.486	9.126:	1.546:
443.336	0.594	9 329:	1.631
444.356	0.653	9 431:	

TABLE III

Fundamental data for the five cepheids observed

Star	Period (days)	log P	l	b	⟨V int	Vmax	Vmin
X Lac	5.445	0.736	106°.56	— 2°.51	8.388	8.178	8.590
RR Lac	6.416	0.807	105°.64	— 2°.01	8.825	8.415	9.201
U Vul	7.991	0.903	056°.07	— 0°.28	7.146	6.801	7.510
Z Lac	10.886	1.037	105°.76	— 1°.63	8.396	7.875	8.830
CD Cyg	17.071	1.232	071°.07	+ 1°.43	8 969	8.301	9.508

Star	ΔV	⟨B - V⟩mag	(B - V)max	(B - V)min	Δ(B - V)	⟨U - B mag	(U - B)max
X Lac	0.412	0.938	0.802	1.038	0.236	0.519	0.442
RR Lac	0.786	0.937	0.707	1.099	0.392	0.536	0.425
U Vul	0.709	1.349	1.133	1.500	0.367	0 858	0.710
Z Lac	0.955	1.168	0 836	1.385	0.549	0.773	0.530
CD Cyg	1.207	1.412	0.958	1.673	0.715	1.063	0.655

Table III (continued)

Star	$(U-B)_{min}$	$\Delta(U-B)$	$E_{\langle B-V\rangle mag}$	$\langle (B-V)_o \rangle_{mag}$	$\langle M_v \rangle^{(1)}_{int}$	$\langle M_v \rangle^{(2)}_{int}$
X Lac	0.578	0.136	0.38	0.56	−3 49	−3.59
RR Lac	0.670	0.245	0.29	0 65	−3.70	−3.76
U Vul	1 036	0.326	0.65	0.70	−4.35	−4.01
Z Lac	1.043	0.513	0 42	0.75	−4.50	−4.36
CD Cyg	1.485	0 830	0.55	0.86	−5.40	−4.90

Star	$r^{(1)}$ (kpc)	$r^{(2)}$ (kpc)	$r^{(1)}\sin b$ (pc)	$r^{(2)}\sin b$ (pc)	R. V. km/sec	Spectrum
X Lac	1.41	1.47	−62.	−64.	−25.0	F6 - G0
RR Lac	2.14	2.20	−75.	−77.	−34.5	F6 - G2
U Vul	0.81	0.69	− 4.	− 3.		F8 Iab - G2
Z Lac	2.12	1.99	−60.	−57.	−25.0	F6 Ib - G6 Ib
CD Cyg	3.50	2.78	+ 87.	+ 69.	−10.3	F8 Ib - K0 Ib

ΠΕΡΙΛΗΨΙΣ

Εἰς τὴν παροῦσαν ἐργασίαν παρέχονται τὰ ἐξαγόμενα τῶν φωτοηλεκτρικῶν παρατηρήσεων εἰς τρία χρώματα (U, B, V) τῶν πέντε γαλαξιακῶν κηφειδῶν CD Cyg, X, Z, RR Lac καὶ U Vul, αἱ ὁποῖαι ἐξετελέσθησαν κατὰ τὰ ἔτη 1967 - 1970 τῇ βοηθείᾳ τοῦ κατοπτρικοῦ τηλεσκοπίου διαμέτρου ἀντικειμενικοῦ 38 ἑκ. τοῦ Ἀστεροσκοπείου τοῦ Ἀμβούργου τοῦ ἐγκατεστημένου εἰς τὸν Ἀστρονομικὸν Σταθμὸν Στεφανίου Κορινθίας.

Ἐπὶ τῇ βάσει τῶν ἐξαγομένων τούτων ὑπελογίσθησαν διάφορα χαρακτηριστικὰ μεγέθη τῶν κηφειδῶν τούτων καὶ ἐμελετήθη ἡ συμπεριφορὰ τῶν ἐν λόγῳ ἀστέρων εἰς τὸ διάγραμμα τῶν δύο δεικτῶν χρώματος (U - B) / (B - V).

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Ὁ Ἀκαδημαϊκὸς κ. **Ἰω. Ξανθάκης,** παρουσιάζων τὴν ἀνωτέρω ἀνακοίνωσιν, εἶπε τὰ ἑξῆς :

Ἔχω τὴν τιμὴν νὰ παρουσιάσω εἰς τὴν Ἀκαδημίαν τὰ πορίσματα τῶν ἐρευνῶν τῶν κυρίων Γεωργίου Ἀστεριάδου, Λυσιμάχου Μαυρίδου καὶ Ἀλεξάνδρου Τσιούμη, ὑπὸ τὸν τίτλον «Φωτοηλεκτρικαὶ παρατηρήσεις εἰς τρία χρώματα τῶν Γαλαξιακῶν Κηφειδῶν».

Ἡ σημασία τῶν κηφειδῶν διὰ τὴν μελέτην τῆς δομῆς τοῦ Γαλαξίου μας καὶ τῶν λοιπῶν ἀστρικῶν συστημάτων εἶναι πρὸ πολλῶν ἐτῶν γνωστὴ καὶ στηρίζεται κατὰ κύριον λόγον εἰς τὴν σχέσιν ποὺ ὑπάρχει μεταξὺ περιόδου καὶ λαμπρότητος αὐτῶν. Κατὰ τὰ τελευταῖα ὅμως ἔτη ἡ προσοχὴ τῶν ἀστρονόμων ἤρχισε νὰ στρέφεται καὶ εἰς τὴν μελέτην αὐτοῦ τούτου τοῦ φαινομένου τῆς ἀναπάλσεως τῶν κηφειδῶν, καθὼς καὶ εἰς τὰς μεταβολὰς τοῦ φαινομένου τούτου μετὰ τοῦ χρόνου. Οὕτως ἐγεννήθησαν τὰ ἑξῆς δύο προβλήματα ἐπὶ τοῦ προκειμένου : α) Ἡ περίοδος τῆς μεταβολῆς τῆς λαμπρότητος ἑνὸς κηφείδου παραμένει σταθερὰ μετὰ τοῦ χρόνου ; ἐν ἀρνητικῇ δὲ περιπτώσει πῶς μεταβάλλεται αὕτη ; β) Κατὰ τὰ χρονικὰ διαστήματα κατὰ τὰ ὁποῖα ἡ περίοδος ἑνὸς κηφείδου παραμένει σταθερὰ ἡ μορφὴ τῆς καμπύλης φωτὸς ἢ χρώματος αὐτοῦ παραμένει ἐπίσης σταθερά ;

Διὰ νὰ δυνηθῶμεν νὰ ἀπαντήσωμεν εἰς τὰ δύο ταῦτα ἐρωτήματα τὰ ὁποῖα εἶναι βασικῆς σημασίας διὰ τὴν μελέτην τῆς ἐξελίξεως ὄχι μόνον τῶν κηφειδῶν ἀλλὰ καὶ τῶν ἄλλων ἀστέρων, πρέπει νὰ διαθέτωμεν, μὲ τὴν βοήθειαν καταλλήλων παρατηρήσεων, ἀκριβεῖς καὶ πλήρεις καμπύλας φωτὸς καὶ χρώματος πολυαρίθμων γαλαξιακῶν κηφειδῶν.

Οἱ κύριοι Bahner καὶ Μαυρίδης μὲ τὴν βοήθειαν φωτοηλεκτρικῶν παρατηρήσεων εἰς δύο χρώματα ποὺ ἐγένοντο εἰς τὸ Ἀστεροσκοπεῖον τῆς Ἀϊδελβέργης κατὰ τὰ ἔτη 1956 - 1959, κατώρθωσαν νὰ προσδιορίσουν λίαν ἀκριβεῖς καὶ πλήρεις καμπύλας φωτὸς καὶ χρώματος 18 ἐν ὅλῳ γαλαξιακῶν κηφειδῶν. Τὰ ἐξαγόμενα δὲ τῶν παρατηρήσεων τούτων ἀνεκοινώθησαν εἰς τὴν Ἀκαδημίαν Ἀθηνῶν κατὰ τὰ ἔτη 1971 καὶ τὸ τρέχον 1976.

Ἀπὸ τοῦ 1967 ὅμως συνεχίσθησαν αἱ εἰδικαὶ αὗται παρατηρήσεις ὑπὸ τοῦ κ. Λ. Μαυρίδου καὶ τῶν συνεργατῶν του εἰς τὸ Ἀστεροσκοπεῖον Στεφανίου, Κορινθίας. Εἰς τὸ Ἀστεροσκοπεῖον τοῦτο ηὑρίσκετο ἐγκατεστημένον κατὰ τὰ ἔτη 1967 - 1970 ἓν ἀνακλαστικὸν τηλεσκόπιον, διαμέτρου ἀντικειμενικοῦ 38 ἑκ , ποὺ ἀνῆκεν εἰς τὸ Ἀστεροσκοπεῖον τοῦ Ἀμβούργου καὶ ἐχρησιμοποιεῖτο ἐξ ἡμισείας τόσον ὑπὸ τῶν ἀστρονόμων τοῦ Ἀστεροσκοπείου τοῦ Ἀμβούργου ὅσον καὶ ὑπὸ τοῦ προσωπικοῦ τοῦ ὑπὸ τὴν διεύθυνσιν τοῦ κ. Λ. Μαυρίδου Ἐργαστηρίου Γεωδαιτικῆς Ἀστρονομίας τοῦ Πανεπιστημίου Θεσσαλονίκης. Ἀπὸ τοῦ Ἰουνίου ὅμως τοῦ 1971 ἐγκατεστάθη εἰς τὸ ἐν λόγῳ Ἀστεροσκοπεῖον ἓν νέον ἀνακλαστικὸν τηλεσκόπιον, διαμέτρου ἀντικειμενικοῦ 80 ἑκ. περίπου, ποὺ ἀνήκει εἰς τὸ Ἐργαστήριον Γεωδαιτικῆς Ἀστρονομίας τοῦ Πανεπιστημίου Θεσσαλονίκης. Τὸ τηλεσκόπιον τοῦτο, τὸ ὁποῖον εἶναι ἐξωπλισμένον μὲ σύγχρονον φωτοηλεκτρικὸν φωτόμετρον καὶ φασματογράφον, εἶναι τὸ μεγαλύτερον τῶν ἐν λειτουργίᾳ σήμερον τηλεσκοπίων εἰς ὁλόκληρον τὴν Βαλκανικήν.

Ἓν ἀπὸ τὰ πρῶτα ἐρευνητικὰ προγράμματα τὰ ὁποῖα διεξήχθησαν κατ' ἀρχὰς διὰ τοῦ τηλεσκοπίου τοῦ Ἀστεροσκοπείου τοῦ Ἀμβούργου τῶν 38 ἑκ. καὶ ἐν συνεχείᾳ διὰ τοῦ τηλεσκοπίου τῶν 80 ἑκ. τοῦ Πανεπιστημίου Θεσσαλονίκης ὑπῆρξεν ἐκ νέου ὁ προσδιορισμὸς κατὰ τὸ δυνατὸν περισσότερον ἀκριβῶν καὶ πλήρων καμπυλῶν φωτὸς καὶ χρώματος ὡρισμένων ἐκ τῶν γαλαξιακῶν κηφειδῶν ποὺ εἶχον προηγουμένως παρατηρηθῆ ὑπὸ τῶν κυρίων Bahner καὶ Μαυρίδου εἰς Ἀϊδελβέργην. Αἱ μετρήσεις εἰς τὸν σταθμὸν Στεφανίου ἐγένοντο οὐχὶ εἰς δύο χρώματα, ὡς εἶχε γίνει εἰς Ἀϊδελβέργην, ἀλλ' εἰς τρία χρώματα, διὰ νὰ καταστῆ δυνατὸν νὰ μελετηθῆ καὶ ἡ συμπεριφορὰ τῶν ἀστέρων τούτων εἰς τὸ διάγραμμα τῶν δύο δεικτῶν χρώματος, ἡ ὁποία συμπεριφορὰ προσελκύει ἰδιαιτέρως, τὸ ἐνδιαφέρον τῶν συγχρόνων ἀστρονόμων.

Εἰς τὴν παροῦσαν ἀνακοίνωσιν παρέχονται τὰ ἐξαγόμενα τῶν παρατηρήσεων τούτων διὰ 5 ἐν ὅλῳ κηφείδας. Τὰ ἐξαγόμενα δὲ ταῦτα χρησιμοποιοῦνται ἐν συνεχείᾳ διὰ τὸν ὑπολογισμὸν διαφόρων χαρακτηριστικῶν μεγεθῶν τῶν κηφειδῶν τούτων καθὼς καὶ διὰ τὴν μελέτην τῆς συμπεριφορᾶς αὐτῶν εἰς τὸ διάγραμμα τῶν δύο δεικτῶν χρώματος (U - B) / (B - V).