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A NEW W UMA TYPE VARIABLE IN CAMELOPARDALIS

While measuring the high amplitude Delta Scuti star UY Cam in the B and V bands at the Merate Observatory by means of a two beam photometer (Broglia and Conconi, 1992), the stars named c and A in Baker's (1937) finding chart, reproduced in Figure 1, were chosen respectively as comparison and check stars. When the observations were reduced the Δm's between c and A proved to be non constant.

We note that UY Cam was suspected of having variable light curves (Williams, 1964; Beyer, 1966). The number of the measurements of check star A however was not large enough to derive light curves of both c and UY Cam by comparing with star A. The Δm's between c and UY Cam were analysed therefore by means of a period finding technique in order to detect a possible multiple periodicity in UY Cam and to get an insight into the nature of variability of star c. Two sinusoids and their Fourier harmonics up to the fourth one were fitted to the observations by least squares. The period of one sinusoid was kept fixed to the value P=$0^d.26704234$, derived by Beyer (1966) for UY Cam on the basis of a long series of times of maximum. For the other sine curve, P was changed step by step.

Only one period proved to be significant: P=$0^d.76425$. By subtraction of the light changes with P=$0^d.26704234$, the light curves of the new variable were derived. These observations match well with subsequent measurements obtained by assuming the star A as comparison, so that we are confident that the light changes of UY Cam have been fully withdrawn.

The coordinates (2000) of the new variable are: $\alpha = 7^h58^m49^s$, $\delta = +72°46'.3$.

The mean light curves are shown in Figure 2, where the individual plotted points represent average of approximately three measurements in each instance. These observations have been submitted to the I.A.U. Comm. 27 Archives as file number 247E. The new variable shows the typical features of the W UMa type binaries, with partial eclipses.

The following ephemeris was calculated:

Min I = J.D. hel. 2446170.056+$0^d.76425\times$n

Moreover we have the result:

	Max	Min I	Max	Min II
V	$11^m.63$	$11^m.85$	$11^m.64$	$11^m.82$
B–V	+0.38	0.37	0.38	0.37

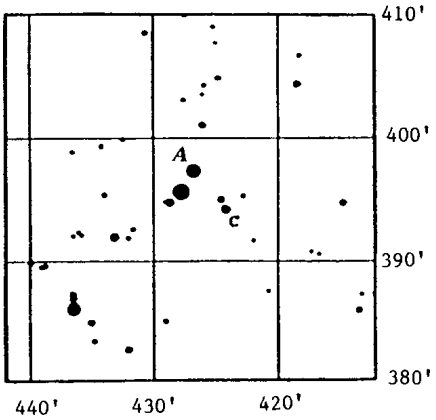

Figure 1

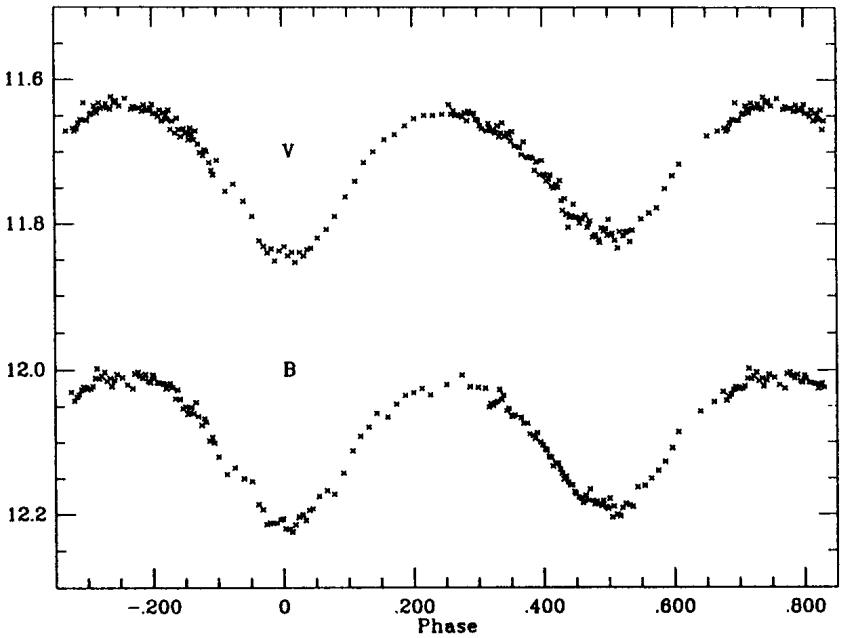

Figure 2

A spectral type F2 is inferred for both components, with no reddening correction.

Photometric solutions were calculated using the code developed by Wilson and Devinney (1971). At first we made several trials with the light curve program. Then the differential correction program was used, in mode 1 option (contact systems). Only the following parameters were adjusted: the inclination i, the luminosities L1 in B and V bands of the primary component and the filling factor F. The other parameters were kept fixed at reasonable values. In particular a bolometric albedo A=0.5 for both components gives a better representation than A=1. The solutions were calculated for several assumed values of mass-ratio q. Both V and B points were used together when deriving the solutions. A strong correlation exists between the adjusted parameters i and F. However the solutions give evidence that the best representation of the light curves can be obtained in the ranges: for q between 0.07 and 0.10, for i from 60 to 63 degrees and with F between 1.4 and 1.6. The results are not conclusive, as the eclipses are shallow and the observations at disposal are quantitatively limited.

When the eclipses are partial and only photometric data are available it is difficult to determine if a system has an A-type or a W-type configuration. Mochnacki (1985) in a review of data for contact binary stars gave some statistical relations regarding these systems. In particular we can see that in the diagrams linking B-V, q, F and the period P, the A-type and the W-type systems occupy well defined and separated regions. The values we have calculated for the new variable suggest that this binary is an A-type system.

P. BROGLIA and P.CONCONI
Merate Observatory
22055 Merate, Italy

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