COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 3748

Konkoly Observatory
Budapest
9 July 1992
HU ISSN 0324 - 0676

Light curves of UY Cam

While performing a Fourier decomposition of the light curves of the high amplitude δ Scuti stars with a view to describing their morphological characteristics (Antonello et al., 1986), the data we found in the literature for UY Cam proved to be inadequate to perform an accurate analysis.

Discovered by Baker (1937), UY Cam has been observed in the UBV system by Williams (1964) who classified the star as an RRc type variable. These measurements are the most consistent photometric data up to now. The mean B-V = $+0^{m}.20$ and the colour range $0^{m}.12$ agree with the spectral classification A3 III - A6 III (Wallerstein, 1958) and no appreciable reddening appears. According to Williams the notable dispersion of points in his light curve may indicate changes from cycle to cycle.

Jones (1966) also obtained a set of UBV photoelectric measurements. Both authors used the star A as comparison (V=$10^{m}.41$, B-V= $+0^{m}.58$), given in the finding chart of Baker, which proved to be constant.

An extensive set of visual observations, starting from 1946 up to 1965 was obtained by Beyer (1966). Twenty-one normal epochs of maximum light have been derived from these observations. Using also an epoch derived from the data of Williams, Beyer computed the following ephemeris:

$$\text{Max= hel. JD } 2435565.236 + 0^{d}.26704234\ n$$

The corresponding O-C residuals show that the period was constant during the eighteen year interval encompassed by these data. According to Beyer the light curve is not stable, in particular its amplitude changes from $0^{m}.17$ to $0^{m}.50$.

Since both Williams and Beyer pointed out an instability of the light curve, suspicion arose that UY Cam can pulsate in two or more modes, so it seemed advisable to obtain new light curves. The B and V photoelectric observations reported in this note were obtained using a two beam photometer applied to the one meter Zeiss reflector of the Merate Observatory (Broglia and Conconi, 1985). Because of mechanical limitations of the photometer, star A of Baker's finding chart cannot be used as comparison because it is too close to the variable. Star c was used instead and star A served as the check star. As soon as the observations of the first three nights were reduced, star c appeared to be variable, and from then on UY Cam was compared to SAO 6369. This star proved to be constant; the means of some tens of B and V magnitudes differences between SAO 6369 and A have in fact r.m.s. errors of $0^{m}.010$. Assuming for A the values V= $10^{m}.41$, B-V= $+0^{m}.58$ given by Williams (1964), for SAO 6369 we have: V=$8^{m}.63$, B-V = $+0^{m}.68$. In order to get insight into the variation of the star c and try to recover the measurements of UY Cam referred to star c, because we do not dispose moreover of a sufficiently large number of measurements of check star A, an analysis of the $\Delta m = m_c - m_{UY}$ was performed using a period finding technique. It was shown that the star c is a W UMa type variable with a period of 0.76425 days (Broglia and Conconi, submitted to IBVS). Afterwards the light variation of star c, represented by a cosine series, was subtracted from the Δm's of the first three nights and the light curves of UY Cam were derived. These light curves match well with those obtained on the following two nights, while referring UY Cam to SAO 6369. The average deviation of an observation in relation to a Fourier least squares fit of the light curves with harmonic up to the fourth, as it is usual to get a good representation of the light curves for most monoperiodic δ Scuti stars (Antonello et al., 1986), proved indeed to be $0^{m}.007$.

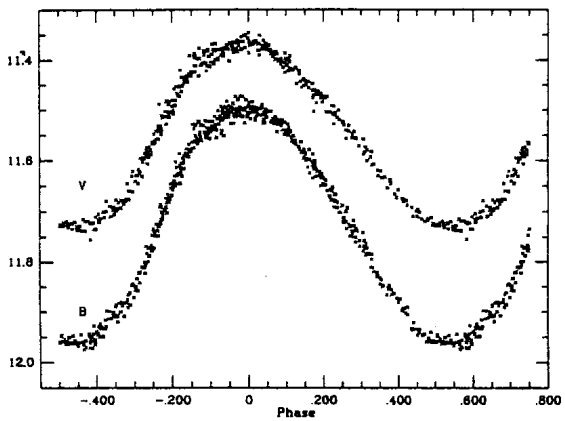

Figure 1

The individual measurements are displayed in Figure 1, and have been submitted to I.A.U. Archives as file number 246E. We have the results:

Max	$V = 11^m.365$	$B\text{-}V = +0^m.13$
Min	11.730	0.23

The following five instants of maximum light have been derived:

hel.JD	2446170.4948
	6171.5640
	6172.3590
	6173.4302
	6184.3815

Hence we have the improved ephemeris calculated over an 38 year interval:

$$\begin{array}{lll} \text{Max} = \text{hel JD } 2435565.2414 + 0.267042254\ n - 405\ 10^{-13}\ n^2 \\ \pm \quad 12 \qquad\qquad 128 \qquad 35 \text{ m.e.} \end{array}$$

A second order term in the fitting of the times of maximum light appears to be meaningful because it allows a 2.5 times reduction of the O-C residuals in relation to the linear ephemeris. The measurements given in this note show no evidence for instability in the light curves like those referred to above. According to the Fourier parameters of light curve (Antonello et al., 1986) UY Cam appears to be a high amplitude monoperiodic pulsator of the morphological group A.

P. Broglia and P. Conconi

Merate Observatory

22055 Merate, Italy

References:

Antonello E., Broglia P., Conconi P., Mantegazza L.: 1986,Astron. Astrophys. **169**,122

Baker E.A.: 1937, MNRAS **98**,65

Beyer M.: 1966, A.N. **289**,95

Broglia P., Conconi P.: 1985, Astron. Astrophys. **149**,15

Jones D.H.P.: 1966, Greenwich R. Obs. Bull. No. 112

Wallerstein G.: 1958, Dissertation, California Institute of Technology

Williams J.A.: 1964, PASP **76**,50