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VARIABLE C IN M33

Variable C is a Luminous Blue Variable (LBV, see Lamers 1987). Its variability was discovered by Hubble and Sandage (1953). Photographic and UBV(R) magnitudes or light curves were published by Hubble and Sandage (1953), Humphreys (1975), Humphreys et al. (1984), Rosino and Bianchini (1973), Sharov (1973, 1981) and van den Bergh et al. (1975).

As a result of the supernova search carried out in Konkoly Observatory (by M. L.) there are eighty plates of M33 which were used to estimate the magnitudes of the LBVs of this galaxy (results for Var. B and Var. 2=Y Tri will be reported later). The observations were made between 1965 and 1987 with the 60/90/180 cm Schmidt-telescope of Konkoly Observatory in Piszkés-tető using Kodak 103aO plates without filters. The magnitudes, given in Table I, are eye estimates using the sequence of Hubble and Sandage (1953). The uncertainty in these values is about 0.5 mag.

The light curve of Var. C is shown in Figure 1. It can be seen that the star is in its maximum phase. Previously only one bright maximum was observed by Hubble and Sandage (1953), though Rosino and Bianchini (1973) also reported a small, flat maximum in the middle 60's.

Lamers (1987) divided the light curve changes of the LBVs into three classes. The observed variation of Var. C clearly belongs to the second class, i.e. the moderate variations (the photographic amplitude is $\sim$1.5 mag). This means that the change in brightness is connected with increased

Table I

Photographic observations of Variable C

J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}
2400000+		2400000+		2400000+	
39090.51	16.6	41714.34	16.5	44136.58	16.6
39498.38	16.3	41903.53	16.7	44167.47	16.6
39529.3	16.5	41921.55	16.7	44256.3	16.7
39711.55	16.1	42008.55	16.7	44554.47	16.6
39766.41	16.4	42066.4	16.7	44912.59	16.8
39796.44	16.5	42095.3	16.7	44989.29	16.6
39827.53	16.7	42278.44	16.7	45018.31	16.7
40073.56	16.4	42397.36	16.8	45197.53	16.8
40092.48	16.1	42473.31	16.8	45230.43	16.8
40144.49	16.6	42695.46	16.7	45261.46	16.7
40157.49	16.1	42725.47	16.8	45347.26	16.6
40183.42	16.5	42754.44	16.7	45593.5	16.0
40203.38	16.4	42756.5	16.8	45615.46	16.0
40230.24	16.4	43013.52	16.7	45647.49	15.6
40654.31	16.6	43072.49	16.7	45940.56	15.5
40798.54	16.6	43191.3	16.7	46026.43	15.4
40837.56	16.7	43344.57	16.6	46030.28	15.3
40916.47	16.7	43399.43	16.8	46321.43	15.4
41164.53	16.7	43430.5	16.6	46355.55	15.6
41183.5	16.7	43464.5	16.7	46441.35	15.3
41213.45	16.6	43489.29	16.7	46468.36	15.3
41518.55	16.4	43720.55	16.7	46677.57	15.4
41520.51	16.6	43756.43	16.7	46706.41	15.5
41625.46	16.6	43757.56	16.8	46738.5	15.7
41679.26	16.6	43787.54	16.8	46763.46	15.6
41687.38	16.5	43809.56	16.6	47060.48	15.5
41689.28	16.6	43815.28	16.6		

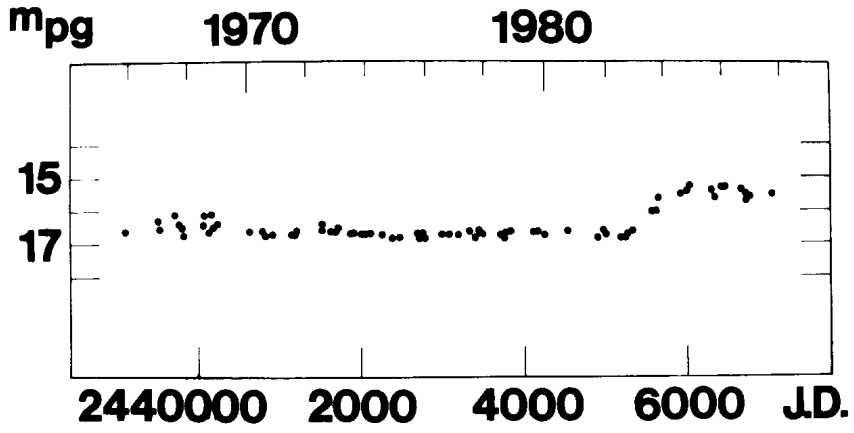

Figure 1

mass loss, while the bolometric magnitude is constant (M_{bol}=-9.8 mag, Humphreys et al. 1987). Using the theoretical calculations of Davidson (1987), Lamers (1987) derived various relations between temperature, magnitude and mass loss rate. For small rates the connection between the change in mass loss and change in magnitude is

$$\Delta \log \dot{M} \approx -0.3\, \Delta m_v$$

Unfortunately, we have photographic amplitude instead of visual, so the values of $\Delta \log \dot{M}$ were calculated for several values of Δm_v. Adopting the value of $\dot{M}=3\cdot10^{-5}$ $M_\odot$/yr for the mass loss rate in maximum (Humphreys et al. 1987), the calculated minimum rates are given in Table II.

Table II

Δm_v	$\Delta \log \dot{M}$	$\dot{M}$ ($M_\odot$/yr)
1.0	-0.30	$1.5\cdot10^{-5}$
1.5	-0.45	$1.1\cdot10^{-5}$
2.0	-0.60	$7.5\cdot10^{-6}$

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