

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 3450

Konkoly Observatory
Budapest
2 April 1990
HU ISSN 0374 - 0676

A PERIOD DETERMINATION FOR M28 V7

In two papers (Wehlau and Sawyer Hogg, 1984; Wehlau et al. 1986) on the variable stars in the globular cluster M28 (NGC 6626, C1821-249) it was reported that V7 was visible on only a few of the more than 300 plates taken from 1939 through 1985 and could possibly be a U Gem star. Subsequent spectra of the variable taken by Smith and Stryker (Smith and Wehlau, 1985) and by Margon and Anderson (1985) showed it to be a probable Mira variable. Because the star was usually below the plate limit on the earlier plates we decided to take a series of deeper plates of the cluster over as many months each year as possible.

Table I lists the magnitudes for V7 determined from 41 plates taken with the 61 cm telescope of the University of Toronto at the Las Campanas Observatory from 1980 through 1989. Also listed are magnitudes from five plates taken when the star was near maximum brightness with the 1.2 m telescope of the University of Western Ontario. These are identified with an asterisk in the table. Magnitudes from both sets of plates, all of which were 103a-0 + GG385, were determined at the University of Western Ontario by means of iris photometry (given to 0.01 mag in the table) or eye estimates (given to 0.05 mag). We estimate the uncertainty in the iris photometry to be ± 0.08 mag when the star is brighter and ± 0.15 when it is faint and that of the eye measures as ± 0.10 mag. The photoelectric sequence of Alcaïno (1981) was used as a standard. The values given here may differ slightly from those listed in Table IX of Wehlau et al. (1986) because the plates were remeasured. In addition magnitudes have been estimated from a few plates taken in 1982 and 1985 which were not included in the earlier table.

Table I. Blue magnitudes for M28 V7

JD 2440000+	B	JD 2440000+	B	JD 2440000+	B
4371.9	16.55	6294.7*	16.15:	6942.8	16.71
4426.8	17.2 :	6323.6*	15.9	6973.8	16.83
4428.9	17.25:	6328.6	15.9	6973.8	17.10
4431.7	17.4 :	6354.5*	16.35	7285.8	16.75:
4432.7	17.4 :	6552.9	18.8 :	7289.9	16.53
5118.9	18.6	6600.7	17.7	7297.9	16.98
5120.8	18.8 :	6600.9	17.5	7626.9	16.96
5163.8	18.85	6613.6	16.72	7627.9	17.07
5169.5	18.8 :	6613.6	16.72	7628.9	17.34
5169.6	18.5 :	6613.7	16.65	7680.7	18.5 :
6181.9	18.6	6613.8	16.75	7680.7	18.5 :
6183.8	18.8 :	6613.8	16.65	7681.8	18.53
6200.9	18.65	6613.9	16.7	7706.7	18.6 :
6208.8	18.65	6652.6*	16.2	7707.7	18.6 :
6228.9	18.8 :	6676.6*	16.55	7709.7	18.6 :
6229.9	18.65				

*Indicates plates taken with the University of Western Ontario telescope

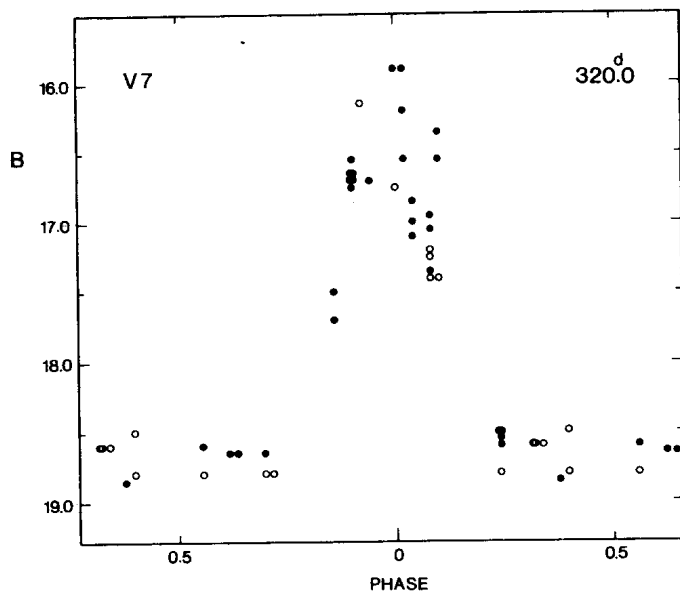


Fig. 1. Blue light curve for M28 V7.

The magnitudes listed in Table I are plotted in Fig. 1 where phases have been computed from an epoch of maximum of JD = 2446321 and the open circles represent observations of lower weight. It can be seen that a period of 320.0 days fits these observations well. The estimated magnitude of 18.8 near minimum may well be too bright due to blending of the image of the variable with that of a nearby faint star. Because of this it is not possible to obtain a good mean blue magnitude for the variable. However, Clement et al. (1982) found that, in blue light, Mira stars at maximum should be about one to two and a half magnitudes brighter than the horizontal branch. Since B_{HB} for M28 is near 16 mag, we conclude that V7 is too faint to be a cluster member.

Although the magnitudes plotted in Fig. 1, all of which represent data from 1980 to 1989, fit well, some of the values listed by Wehlau et al. for dates earlier than 1957 appear to be too bright. This can probably be attributed to the poorer quality of some of the older northern hemisphere observations. In 1952 the star, which certainly did reach a blue magnitude near 15, appears to have had both a brighter and longer maximum than usual. A period of 320.0 days predicts maximum at JD 2434161 for that year, 20 days earlier than the date of the first plate of 1952 listed in Wehlau et al. It should be noted that the date is incorrectly listed there as 31181.827 and should be 34181.827. Another incorrect date given in the same table is that for plate A1692 which is given as 46295.607 when it should be 46294.679.

We wish to thank the staff of the University of Toronto Southern Observatory for assistance in taking the plates and Steve Butterworth for making the magnitude determinations. Each of us gratefully acknowledges the support of the Natural Sciences and Engineering Research Council of Canada.

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