PHOTOELECTRIC PHOTOMETRY OF V491 LYRAE AND LM PEGASI

Daniel H. Kaiser
2631 Washington Street
Columbus, IN 47201

David B. Williams
P. O. Box 58
Whitestown, IN 46075

John E. Isles
11105 Tremont Lane
Plymouth, MI 48170

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Abstract

Photoelectric photometry of V491 Lyrae and LM Pegasi indicates that these stars are small-amplitude red semiregular variable stars. Observations of V491 Lyr ranged from 8.2–8.9 V with a period of 66.3 days. LM Peg varied from 9.0–9.5 V with a probable period of 68.6 days, although a denser time series of observations is needed to confirm this value.

1. V491 Lyrae

Variability of the M-type star SAO 47682 (BD +40.3449, HD 172740, IRC +40324) was discovered by Kaiser (1991), who gave it the designation DHK 19 in his discovery list. This new variable was designated V491 Lyr in the 72nd Name List (Kazarovets and Samus 1995).

Williams (1992) estimated the star on Harvard College Observatory patrol plates and found semiregular variations with an extreme range of 9.2–10.5 ptg and a weakly defined period near 68 days. To improve this result, we made photoelectric observations during the 1994 season. DHK observed with a 35-cm Schmidt-Cassegrain telescope and Optec SSP-5 photometer. DBW used an Optec SSP-3 photometer with his 28-cm Schmidt-Cassegrain and the 90-cm Cassegrain telescope at the Goethe Link Observatory of Indiana University. JEI observed with a 12.5-cm Schmidt-Cassegrain and SSP-5 photometer. DHK observed in both V and B filters, JEI and DBW in V only.

All observations were made differentially with the K0 star SAO 47678 (HD 172692) as the comparison star, for which we adopted the values 7.79 V, +0.94 B-V from Mermilliod (1991). The G5 star SAO 47704 was observed as a check star. The check star measures were constant in the range ±0.02 magnitude. Table 1 lists the observations, each of which is the mean of three or more measures. Each observation has been corrected for extinction and transformed to the Johnson standard system using the variable's mean B-V value of +1.49 measured by DHK.

A light curve plotted from these observations (Figure 1) shows the variable declining from a bright maximum, followed by two cycles of smaller amplitude. Analysis of the data by discrete Fourier transform produced a strongest period at 66.3 days. While more observations would be useful, it appears that V491 Lyr is a red semiregular variable with a period near 66 days and considerable differences in the cycle to cycle amplitude. The range of variation is at least 8.2–8.9 V.

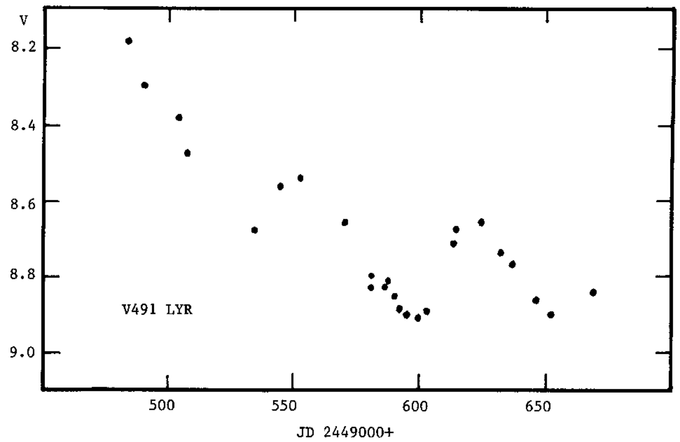

Figure 1. Photoelectric V observations of V491 Lyrae.

Table 1. Photoelectric observations of V491 Lyrae.

JD 2400000+	*V*	*Observer*	*JD 2400000+*	*V*	*Observer*
49483.715	8.18	I	49592.642	8.89	K
49489.682	8.29	K	49594.599	8.90	K
49504.665	8.38	I	49599.621	8.91	K
49507.663	8.48	K	49602.649	8.89	K
49534.720	8.65	W	49613.621	8.71	W
49534.725	8.68	K	49614.604	8.68	K
49544.711	8.57	K	49624.572	8.66	W
49552.683	8.51	W	49624.638	8.65	K
49570.703	8.66	W	49632.538	8.74	W
49580.587	8.81	W	49636.599	8.77	K
49580.678	8.80	K	49646.524	8.86	K
49586.655	8.83	K	49652.547	8.90	K
49587.634	8.82	W	49653.558	8.93	W
49589.647	8.86	K	49668.537	8.85	K

I = Isles, K = Kaiser, W = Williams

2. LM Pegasi

Variability of the M2 star SAO 91369 (BD +26.4660) was also discovered by Kaiser (1992), who designated it DHK 28 in his discovery list. It received the official designation LM Peg in the 72nd Name List (Kazarovets and Samus 1995). Williams (1995) investigated the star on Harvard College Observatory patrol plates and found a weakly defined period of 72 days. DHK made photoelectric observations during 1992 and 1993 with the equipment described above. The comparison star was SAO 91410 = HD 222390. The magnitude 6.66 V and color index +1.06 B-V were adopted from Bakos (1969). The check star was SAO 91405 = HD 222317 (7.07 V, +0.67 B-V, same reference). The difference between the comparison and check stars remained

Table 2. Photoelectric observations of LM Pegasi.

JD 2400000+	*V*	*JD 2400000+*	*V*
48835.811	9.24	49010.528	9.39
48855.704	9.28	49013.534	9.41
48885.702	9.46	49017.530	9.43
48897.637	9.42	49199.725	9.10
48918.647	9.30	49213.722	9.26
48956.568	9.34	49249.608	9.05
48975.529	9.16	49259.692	9.03
48981.578	9.12	49260.627	9.03
49007.526	9.36	49266.632	9.10

All observations by Kaiser

constant at the ±0.02 magnitude level. Each observation has been corrected for extinction and transformed to the Johnson standard system using the B-V value measured on each night. The variable's mean B-V for all the observations was +1.66.

The observations are listed in Table 2. A period search by discrete Fourier transform found two nearly identical frequency peaks equivalent to periods of 68.6 and 55.7 days. Four times the first period and five times the second period are very nearly equal to the 276 days between the two most definite maxima in the observations. A more continuous observational record is needed to decide between these two periods. Until such observations become available, we favor the 68.6-day period because it is the same, within expected uncertainties, as the 72-day period found from the long-term photographic observations. Like the previous star, LM Peg is a short-period, small-amplitude, red semiregular variable with a variable amplitude. The observations reported here show a range of 9.0–9.5 V.

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