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IS K1098 IN M15 A SHORT PERIOD RED VARIABLE STAR?

The red star K1098 (Küstner, 1921) in the globular cluster M15 was found by Yao to be a new suspected variable star. Now we have checked it with CCD photometry and confirmed its variability. According to our determination, its $V=15^m67$ and $B-V=0^m97$. The coordinates of the star relative to the cluster center are: $x=332''$, $y=90''$. The location of the star on the C-M diagram is shown in Fig.1. Neither radial velocity nor proper motion determinations are found in literature. Maybe it is a field star.

The star was observed by us with the RCA CCD #1 attached to the Cassegrain focus of the Zeiss 1-m reflector ($f/13.3$) at the Yunnan Observatory in December 1992 and with the RCA CCD #2 at the same telescope in May 1993. The CCD #1 contains 320×512 pixels at a scale of $0''.47/\text{pixel}$, thus covering a $2'.5 \times 4'$ field and the CCD #2 512×512 pixels at the same scale covering a $4' \times 4'$ field. A total of 31 yellow and 4 blue 600 second exposures were obtained. The seeing was between $2''.0$ and $4''.0$ (FWHM). The reduction process was identical to that used before (Yao, 1990, 1993). The results are:

$$m(t) = m_0 + \sum_{i=1}^2 a_i \sin(2\pi t/p_i + 2\pi\phi_i)$$

$$\begin{array}{lll} \text{Here } p_1=0^d5155, & a_1=0.0566, & \phi_1=0.0050 \\ p_2=0^d0927, & a_2=0.0193, & \phi_2=0.3727 \end{array}$$

The m_0 represents the mean magnitude difference between K1098 and the comparison star K1073, which is also a red star of similar color.

The folded light curves are given in Figures 2 and 3. Each light curve is plotted with the data prewhitened with the other frequency. Here the circles represent the observations on 16 December 1992, the open triangles on 17 December 1992, the x's on 23 May 1993, the squares on 24 May 1993 and the filled triangles on 26 May 1993.

The interstellar reddening in the direction of M15 is not large ($E(B-V)=0.12$), so the star K1098 is intrinsically red. Why does a red star pulsate with a short period? How long can the pulsations of these kinds persist?

Further observations are needed to determine the periods accurately and to check their possible variations.

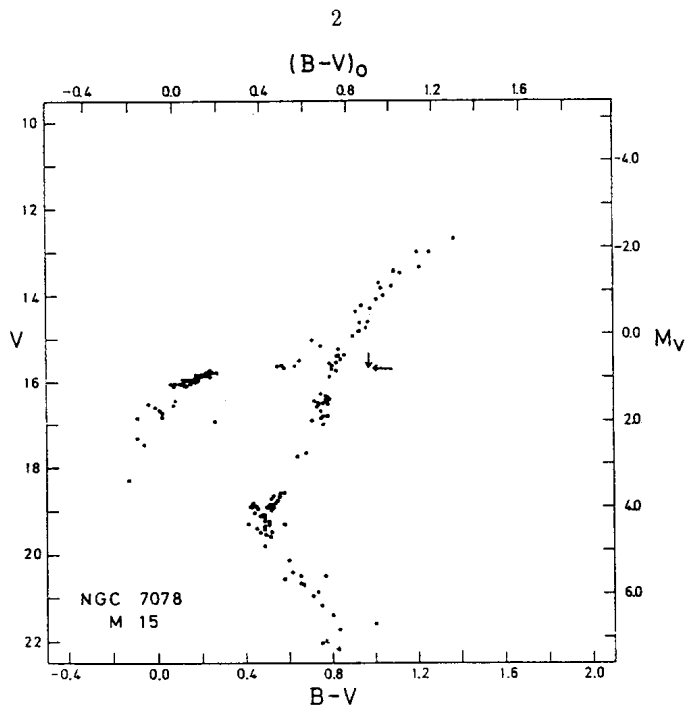


Figure 1

K1098 - K1073

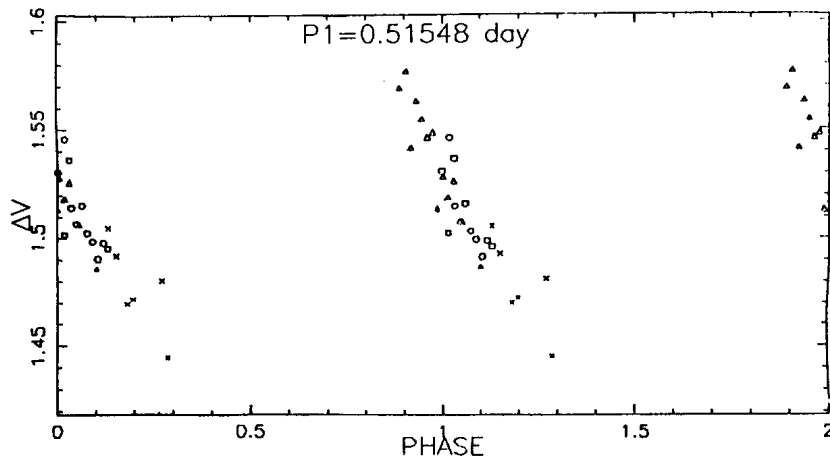


Figure 2

3

K1098 - K1073

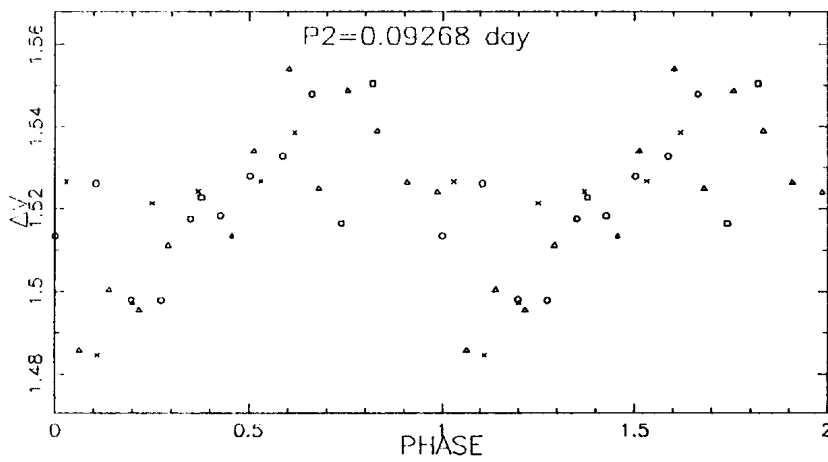


Figure 3

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