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II-52 – A NEW SHORT PERIOD VARIABLE STAR IN M3

II-52 (Sandage, 1953) is located at the lower part of the red giant branch (see Figure 1). Its brightness is fainter than that of the horizontal branch by about one magnitude. The magnitude and colors of the star are V=16.77, B−V=0.65, U−B=−0.01 (Johnson and Sandage, 1956). The coordinates of the star relative to the cluster center are: x=65", y=257". Unfortunately, neither radial velocity nor proper motion determinations are found in literature. To assign the membership of a star according to its position in the C−M diagram (photometric criteria) generally agrees with the proper motion determinations in M3, however, the photometric criteria assigned a few field stars to the cluster and vice versa (Cudworth, 1979).

Surprisingly, II-52 appears to be a new short period variable star. The CCD data we used and the procedure for analysing the variation are the same as those used before (Yao et al., 1993a, 1993b). The same star AO was used as the comparison star. A frequency of $\nu \cong 3.92$ with a height of Z=20.36 in the periodogram was searched out, i.e., the false alarm probability F must be very low and the variation of the star is real. However, due to the fact that II-52 is fainter than AO by about two magnitudes, the photometric precision is not as high as that for vZ1140 and vZ1055 (Yao et al., 1993a, 1993b). The folded light curve is shown in Figure 2 which can be represented by the following formula:

$$\Delta m(t)=2.10+0.01716\ \sin(2\pi t/P+2\pi\phi)$$

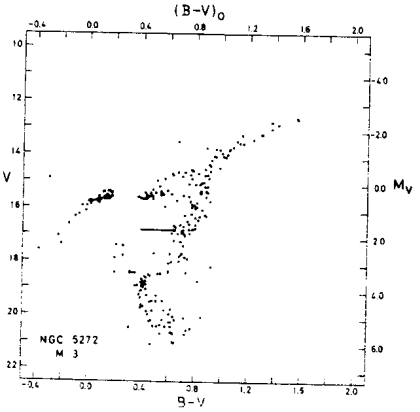

Figure 1

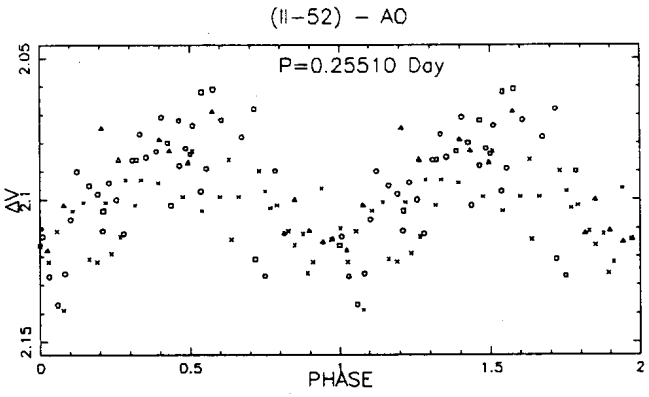

Figure 2

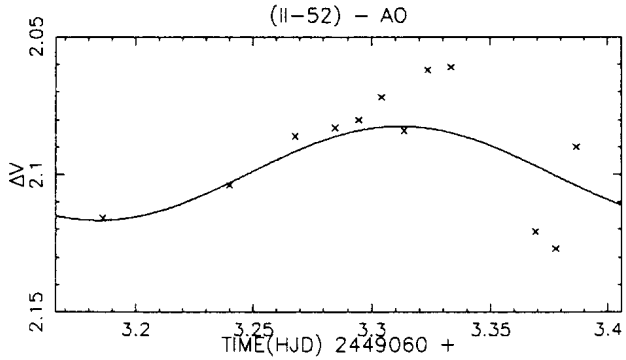

Figure 3

Here the 2.10 is the mean magnitude difference between II-52 and AO, P=0.25510 day, ϕ=0.7670. The "real time" light curves are shown in Figures 3, 4, 5, 6. The symbols in the figures are the same as before (Yao et al., 1993a).

We also used another comparison star (II-58) to check the result, a slightly different period P=0.25306 day was found. The similar folded light curve is shown in Figure 7. Though the magnitude and color of II-58 (V=16.66, B−V=0.67) are similar to that of II-52, the scatter in Figure 7 is larger than that in Figure 2 due to the faintness of both II-52 and II-58.

As far as we know, this is the first report on the variation of a star located at such a position in the C−M diagram (if II-52 is really a cluster member). We hope that the result will be checked by other observers independently.

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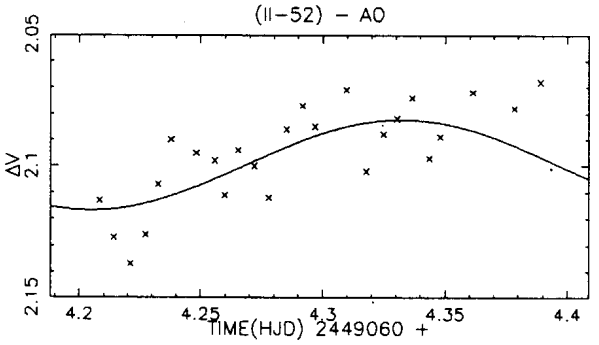

Figure 4

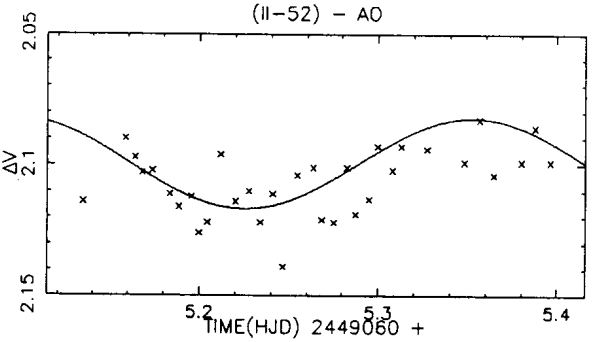

Figure 5

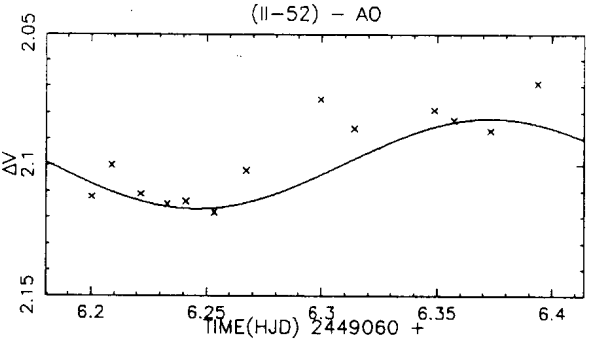

Figure 6

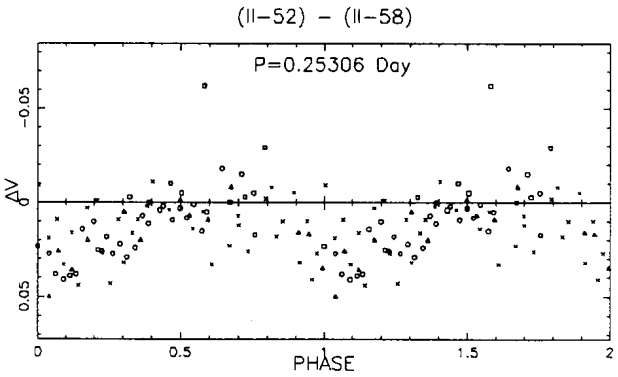

Figure 7

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