

A CANDIDATE FOR THE RECOVERED NOVA OF 1938 IN THE GLOBULAR CLUSTER M 14

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Although close binaries are believed to be of importance in the dynamical evolution of globular clusters, searches for such binaries have produced mostly negative results, aside from x-ray sources. Two dwarf novae which are possible cluster members are known (Margon and Downes 1983) and two classical nova candidates have been found. The crowded field around the nova observed in 1860 close to the center of M80 makes ground-based recovery of that star impossible with present techniques. Here we report on our attempt to recover the star which erupted in 1938 about 30" (0.8 core radii) from the center of M14.

In August, 1983 we imaged the nova field with the RCA CCD camera at the prime focus of the CTIO 4-m telescope using broadband R and B filters and an H_{α} filter. We again imaged the field in May, 1985 with the RCA CCD camera at the prime focus of the AAT using B, V and U filters. All subsequent reductions were done at the ST ScI. Using a position of the nova determined from the discovery plates of Hogg and Wehlau (1964) a faint star was identified on the CCD frames falling within half a pixel (0.3") of the position of the nova.

We have measured the brightness of this candidate and several hundred other stars in the CCD field using the photometry package DAOPHOT (Stetson 1984) with the zero point set by the photoelectric and photographic photometry in M14 of Kogan, Wehlau and Demers (1974). We find $B = 20.2 \pm 0.3$ for our candidate with the rather large estimated error due to background and crowding. This translates into $M_V = +2.7 \pm 0.5$ using the Harris and Racine (1979) values for reddening and distance modulus of the cluster. This is somewhat brighter than the mean value for old novae of 4.1 mag given by Patterson (1984) but within the brightness range which shows a FWHM of ~ 3 mag. However a

calculation of the number of cluster stars in an error circle of 1" diameter centered on the 1938 nova position suggests we should expect to find 0.9 star with $M_V \leq 4$. Therefore our present candidate could be another star masking the fainter nova.

A check of the color of our candidate star can be done using the CMD shown in Figure 1. It can be seen that the nova candidate, designated by an "*", is about 0.2 mag redder than other stars of similar V. In the color-color diagram of M14 given in Figure 2 the candidate is seen to be about 0.7 mag brighter in U than other cluster stars of similar B-V. Its dereddened $(U-B)_0$ color of -0.3 ± 0.4 is similar to that of many old novae (Warner 1973). On the other hand its moderately red $(B-V)_0$ color of 0.8 ± 0.4 is somewhat unusual but could be due to an evolved secondary.

A spectrum of this star is needed before it can be confirmed or rejected as an old nova. A ground-based observation will be extremely difficult due to the star's faintness and the crowding of the field but such an observation would be possible with the Hubble Space Telescope.

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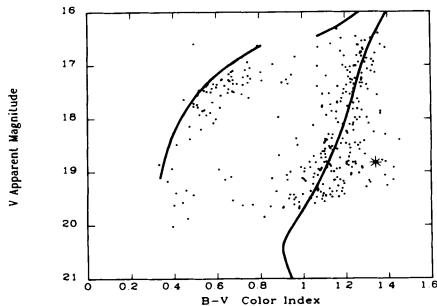


Fig. 1. C-M diagram of M14, derived from CCD camera images. The solid curve is taken from Sandage's (1970) C-M diagram of M13. The nova candidate is designated by an "*".

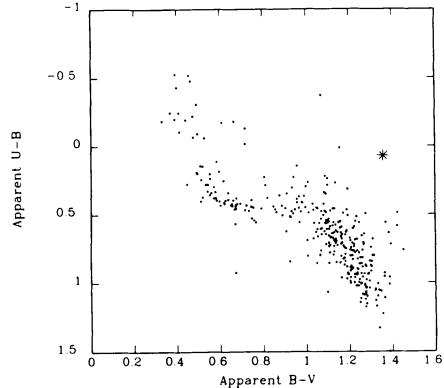


Fig. 2. Color-color diagram of M14 derived from CCD images and showing the candidate as an "*".