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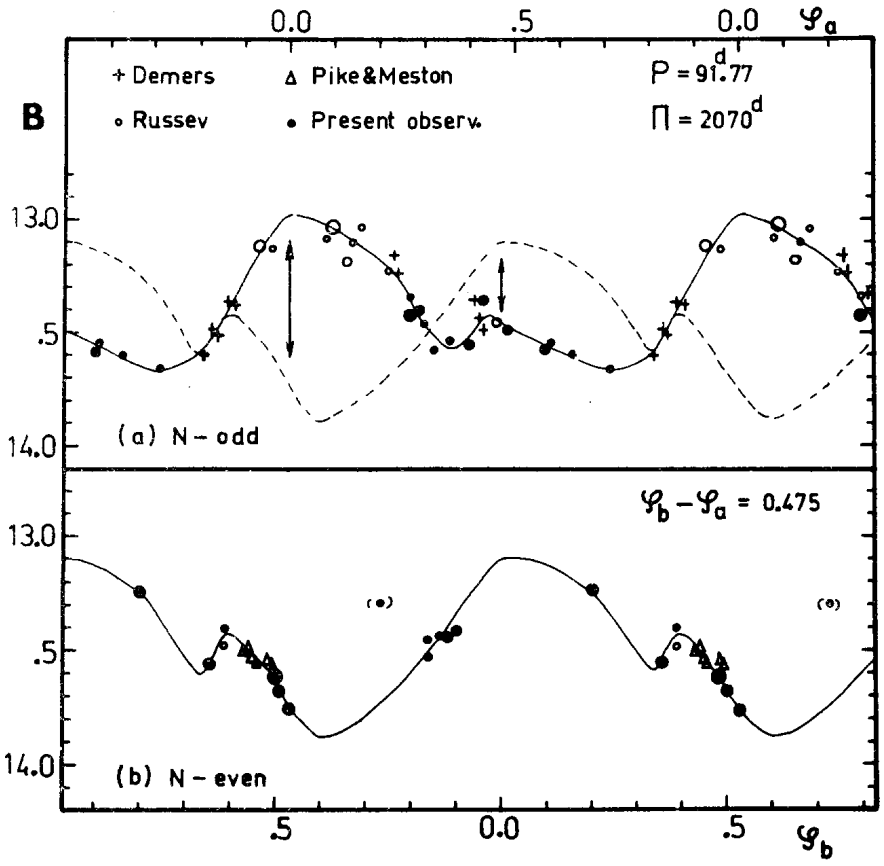
SEMI-REGULAR VARIABLE STAR VII IN M13

The variable star VII (Sawyer-Hogg, Publ.DDO, 3, No.6, 1973) is one of the brightest and reddest stars in the globular cluster M13=NGC 6205. It is undoubtedly physical member of the cluster according to radial velocity measurements (Joy, ApJ. 110, 105, 1949), proper motions (Kadla, Iz.Pulkovo Obs., 24,92, 1966) and position in the colour-magnitude diagram (Russev,Astr. Zr.,51, 122, 1974).

We have investigated the variability of the star VII on 43 blue plates of M13 taken with the 60 cm reflector of the Belogradchik Astronomical Station (Bulgaria) during four years,from 1974 to 1978 (J.D. 2442294-2443669). The photometric system was close to the B one as it was reported recently (Russev and Russeva, I.B.V.S. No. 1534, 1979). In addition to the present observational material we have used the B measurements of Demers (AJ, 76, 445, 1971), Russev (VS, 19, No.2, 181, 1973) and Pike and Meston (MN, 180, 613, 1977).

The analysis of the available observational data, covering about 16 years (J.D. 2437790-2443669), allowed us to establish, (1) that the period $P=91^{d}.77$, obtained by Russev (VS, 19, No.2,181, 1973), presents only the fundamental period of VII and (2) that the light curve is probably subjected to periodical changes, manifested by changing the roles of the main and secondary maxima with a period $\Pi=2070^{d}$. As it is shown in the Figure, where the size of the symbols depends on the number of the observations per night, during 1035^{d} the star has a light curve (Figure a), which is characterized with a secondary maximum (bump) on the descending branch at phase $\varphi \approx 0.45$. During the following 1035^{d} the secondary maximum is transformed in a main one, and the former main maximum



decreases and becomes a bump of the descending branch of the light curve (Figure b) and so on. The data allowed us to study six such changes, the moments of which are obtained by the formula:

$$T = \text{J.D. } 2436370 + 1035^d \cdot N.$$

The odd N gives the beginning of the intervals in which "acts" the first maximum with the following elements of the light curve:

$$\text{Max} = \text{J.D. } 2438228.85 + 91^d.77 \cdot E \quad \text{(Figure a)}.$$

When N is even we have respectively the elements :

$$\text{Max} = \text{J.D. } 2438272.44 + 91^d.77 \cdot E \quad \text{(Figure b)}.$$

It seems that the change of the maxima takes place comparatively quickly, for about 1-2 fundamental periods. The next such change of the VII light curve may be expected at the beginning of 1981.

We have obtained from the light curve for VII $\overline{B}=13^m.45$ and amplitude of the variation $A_B=0^m.68$. Since $\overline{V}=11^m.83$ (from the ob-

servations of Demers, Pike and Meston and two our V plates) the colour index of the star is $\overline{B-V}=+1^{m}.62$.

The red semi-regular variables with periods about 90 days in globular star clusters are not a rarity. We may show at least 6 stars with periods from 90 to 93 days (V2 NGC 362, V148 NGC 5139, V17 NGC 6626, V5 NGC 6656, V6 NGC 6779, V19 NGC 7006), which are similar to VII in M13. Doubtlessly they have something in common with the RV Tau type stars of the Galaxy field, but their connection with them, at present, is not sufficiently investigated.

The details of our studies of VII together with other variables in M13 will be published elsewhere.

RUSCHO RUSSEV and TATIANA RUSSEVA
Department of Astronomy
University of Sofia
Sofia, Bulgaria