

NEW PERIODS FOR TWO VARIABLES IN SAGITTARIUS

MARYJANE TAYLOR
Maria Mitchell Observatory
Nantucket, Massachusetts

Abstract

New periods are computed for the Mira-type variables HM and HN Sagittarii. Positions and finder charts for these stars, as well as those for two new, suspected-variables are included.

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During the summer of 1976, while working as a research assistant at the Maria Mitchell Observatory, I was able to investigate two Mira-type and one new, suspected-variable, star. In addition, while responding to a possible-nova alert, I discovered yet another suspected variable. All four stars are located in the constellation of Sagittarius.

Brightnesses for the first of the Mira-type variable stars, HM Sgr ($18^{\text{h}}20^{\text{m}}-26^{\circ}14'$, 1900), (Figure 1) were measured on 495 NA photographic patrol plates, with the aid of step designations (Dinerstein 1973). The plates covered the time span J.D. 2424056 (Sept., 1924) through JD 2442993 (Aug., 1976). The previously published elements (Hoffleit, 1961) were: J.D. 2437191 + 289^dE. These elements do not satisfy the later data. As a result, I refined the existing elements by applying small corrections to the reciprocal of the existing period, recording the various changes on a diagram plotting phase against brightness (Henry 1972). The "best" period that eventually resulted was checked for possible spurious periods (Henry 1972), but none were found. The new elements are:

$$\text{J.D. } 2438608 + 290^{\text{d}}1\text{E} \quad (1)$$

Figure 2 is the phase-brightness diagram for HM Sgr, constructed with the aid of equation (1).

The second Mira-type variable that was analyzed was HN Sgr ($18^{\text{h}}20^{\text{m}}-26^{\circ}21'$, 1900), (Figure 1). I measured this star on 535 NA plates covering the same time period, and using the same step values as for HM Sgr. Again, the published period of 318^d (Hoffleit 1961) did not adequately satisfy later plate measurements. Analysis of this variable proceeded along the same lines as that previously described for HM Sgr. The following elements satisfy the data:

$$\text{J.D. } 2436400 + 319^{\text{d}}8\text{E} \quad (2)$$

In the investigation of HN Sgr, it was noted that only two well-defined maxima were available for analysis. However, Figure 3 demonstrates the performance of the star according to equation (2).

During the summer, a suspected nova in Sagittarius was reported by an AAVSO visual observer. While we could not find evidence of nova-like activity in the area, I did note possible variability in a star located at $\sim 18^{\text{h}}02^{\text{m}}-26^{\circ}52'$ (1900), (Figure 4). I independently confirmed Dr. Hoffleit's brightness measurements of the star, and so proceeded to measure 545 NA plates. Unfortunately, the star was found to vary in brightness only from $\sim 12^{\text{m}}.4$ to $12^{\text{m}}.6$ (pg). The amplitude is of course too small to determine a period accurately from photographs.

Finally, during the previous summer (1975), I discovered a possible new variable star, T2 Sgr*, located at $\sim 18^{\text{h}}25^{\text{m}}.1-15^{\circ}47'$ (1900), (Figure 5), using the positive-negative discovery method (Guida 1975). Plates NA 3864 where T2 was bright, and NA 3888 where the star was found to be fainter, were compared. I then measured 418 NA plates of the region, again using step values. The values were later converted to magnitudes by the use of the fly spanker (Nygard 1973), and chart 134 of the Harvard-Groningen Selected Area (1965). T2 was found to vary in brightness from

$13^m.7$ to $14^m.3$ (pg). So far, I have not been able to determine a precise period for the star. However, I believe it to be in the range of $0^d.33$ to $0^d.35$. My analysis of this star is still proceeding.

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*Temporary designation for a new variable star.

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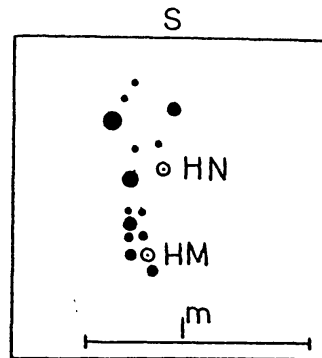


Figure 1. The location of HM and HN Sagittarii.

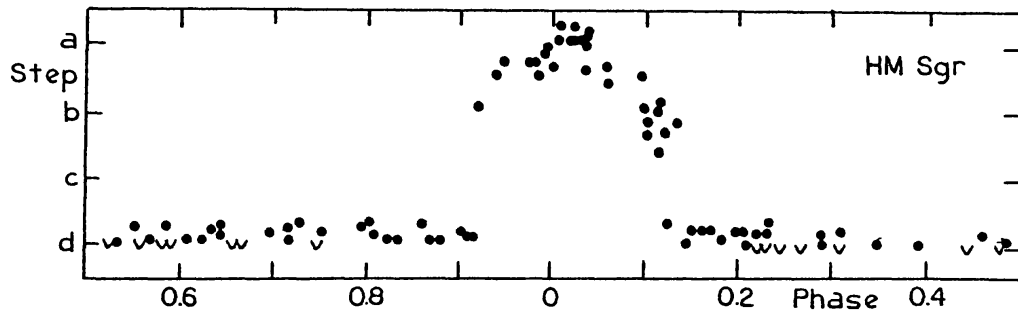


Figure 2. Photographic light curve for HM Sagittarii plotted in accordance with the new period, $290^d.1$.

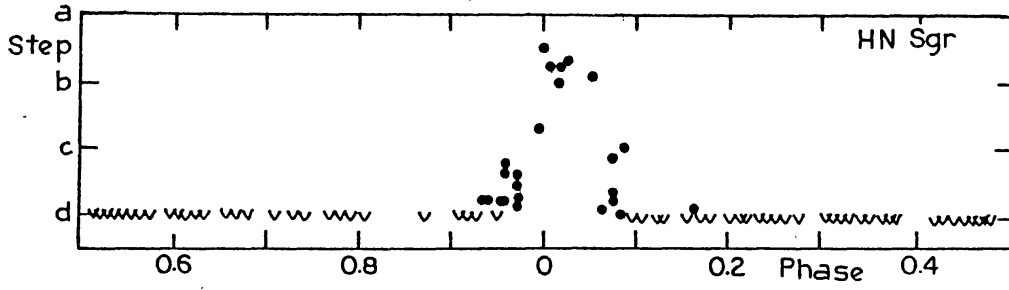


Figure 3. Photographic light curve for HN Sagittarii plotted in accordance with the new period, 319^d8.

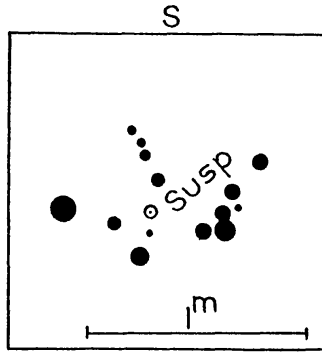


Figure 4. The location of the suspected variable.

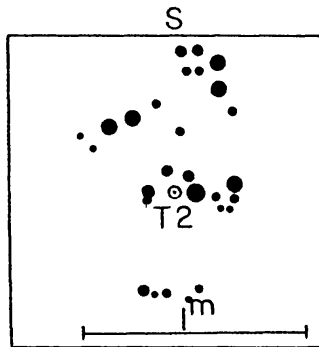


Figure 5. The location of T2 Sagittarii.