LARGE PERIOD CHANGES IN V1176 SAGITTARII

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Abstract

The previously published period for the variable star V1176 Sagittarii, an RR Lyrae star of type RRab, has been confirmed for the years 1942 through 1966. Since 1966, V1176 Sgr has undergone at least two period changes. New periods and epochs have been determined for 1967-76 and 1977-80. V1176 Sgr was observed via the photographic plate collection of the Maria Mitchell Observatory.

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The period 0.3548148 day had been determined for the RRab star V1176 Sagittarii by V. P. Tsesevich (Tsesevich 1969). The published period agrees with observations taken from the photographic plate collection of the Maria Mitchell Observatory for the years 1942 through 1966. The epoch of maximum on the plates, JD 2438266.620, is, however, 0.07 cycle later than predicted by Tsesevich's elements. For 1967 and the following years the observations of V1176 Sgr fit neither Tsesevich's epoch or period. The period which best fits the observations in 1967-76 is 0.354806 day. The new epoch of maximum is JD 2440799.628. Observations made in 1977 and the following years agree with neither set of elements. There seems to have been a second period change, occurring in 1976 or 1977. A period which does agree rather well with observations made in 1977-80 is 0.354776 day or slightly longer. The epoch of maximum is JD 2444050.568. In all three cases there are residuals of ± 0.05 cycle on the rising branch, suggesting that the shape of the light curve varies.

Although the periods determined for V1176 Sgr are short for an RRab variable star, these periods do fall within the range stated by Tsesevich of 0.35 to 0.55 day for RRab variables (Tsesevich 1975). In addition, the shape of the light curve is that of an RRab variable star. In the above reference, Tsesevich defines the quantity ε such that

$$\varepsilon = \frac{(\text{Max} - \text{Min})}{P}, \qquad (1)$$

where Min is the moment of minimum brightness, Max is the moment of the following maximum brightness, and P is the period of the star. RRab variables are observed to have values of ε ranging from 0.1 to 0.2 (Tsesevich 1975). For V1176 Sgr, the value of ε determined from a mean light curve formed from Maria Mitchell observations is 0.16, which is within the range of ε given for the RRab subtype of RR Lyrae stars. Therefore, the light curve and periods determined for V1176 Sgr agree with the designation of this star as an RR Lyrae star of type RRab.

The star V1176 Sgr, then, is a short-period variable of type RRab, which has undergone large period changes separated by several years during which a constant period gives satisfactory representation. These period variations do not follow any simple functional form.

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