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**V577 OPHIUCHI: AN ECLIPSING BINARY WITH A
NON-CIRCULAR ORBIT AND A PULSATING COMPONENT**

During the course of an observing run aimed at determining the times of minima of eclipsing binaries with non-circular orbits, the results of which will be published elsewhere (Diethelm, 1993), a secondary minimum of V577 Ophiuchi was followed with a photoelectric photometer at the 76 cm reflector of the Rosemary Hill Observatory of the University of Florida. Since the results of this investigation were rather surprising, and since they might be of considerable physical implication, we decided to publish them separately.

The observational history of V577 Ophiuchi=BD+06°3679 has been summarized by Meinunger (1981) and by Shugarov (1984). Shugarov's UBV photometry showed, that the orbit V577 Oph is non-circular ($e=0.22\pm 0.08$). He determined its colours to be $B-V=+0.51$ and $U-B=+0.22$ mag, respectively. From an estimate of the interstellar reddening $E_{B-V}=0.2-0.3$, a spectral type of $\approx A8$ was inferred. A remarkable feature of Shugarov's light curve lies in the fact, that his photoelectric observations at maximum light show a scatter in excess of 0.1 mag, much larger than could be expected. Our observations will present an explanation for this.

The secondary minimum of V577 Oph at JD 2449105 was observed by us with the photoelectric photometer at the 76 cm reflector of the Rosemary Hill Observatory of the University of Florida. The details of the observing procedure will be published separately (Diethelm, 1993). Because we were primarily interested in the determination of the time of minimum, no filter was used, in order to get the best signal to noise ratio possible, although the night of JD 2449105 was of exceptional photometric quality. The nearby star BD+06°3680 served as comparison star, while the UBV standard HR 6629= γ Oph was used as check star. In Figure 1, we present the differential photometry in the sense variable minus comparison.

Evidently, some sort of pulsational variation is superimposed on the eclipse light curve. For reasons given below, this variation is intrinsic to V577 Oph, and since it is observable throughout the secondary minimum, it is very likely connected to the component not eclipsed in this minimum. In order to give a better representation of this secondary variation, we have subtracted the best quadratic fit to the observations, simulating the eclipse light curve, from the measurements. Figure 2 shows these residuals. We conclude, that the primary component of V577 Oph not eclipsed at secondary minimum is a δ Scuti variable with a period of about 0.07 days. The spectral type found by Shugarov supports this conclusion.

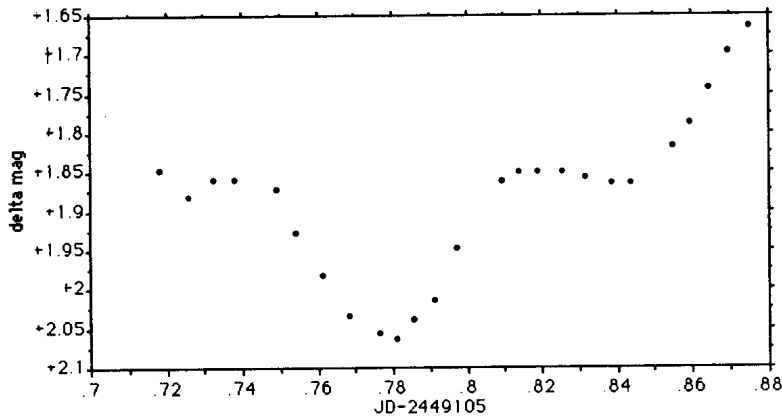


Figure 1. Unfiltered differential photometry of the secondary minimum of V577 Oph relative to BD+06°3680 on JD 2449105.

As a measure to check this conclusion, we decided to observe V577 Oph outside eclipse during the night of JD 2449122 (phase 0.357 to 0.372 according to the elements of Shugarov, 1984). The night was again of good photometric quality. This time, we used a filter which together with the EMI 6256S photomultiplier tube yields magnitudes very close to the standard Johnson B system at the Rosemary Hill Observatory. In Figure 3 we depict the resulting light curve, using the same scales as in Figure 2. As special care was taken to ensure that the variation was not due to the comparison star, these data serve to prove the conclusion reached above.

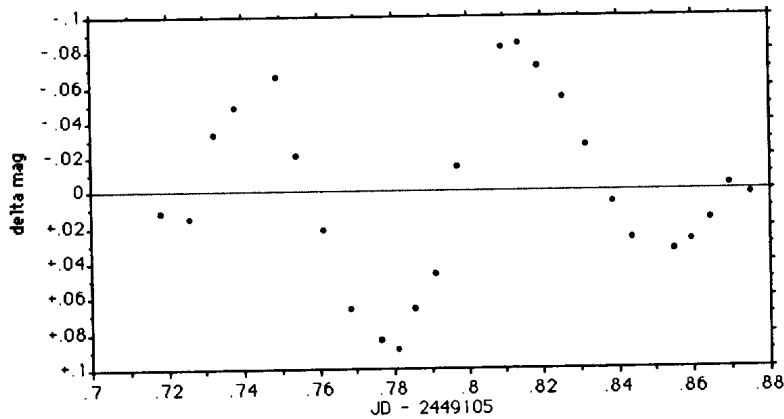


Figure 2. Residual variation after subtracting the eclipse light curve.

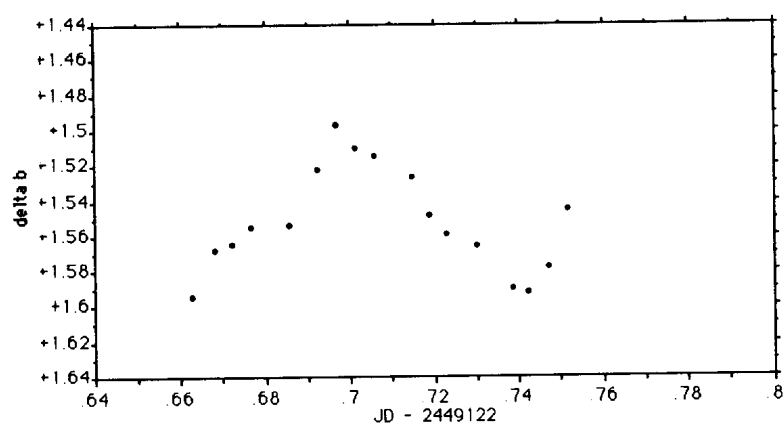


Figure 3. Differential observations of V577 Oph in the instrumental b system at maximum light (JD 2449122).

The physical implication of our finding makes V577 Oph worthy of more thorough investigation. Especially the question, to what extent the variable gravitational field due to the non-circular orbit in this binary has an influence on the characteristics of the pulsation should yield some further insight into the reliability of the models of stellar pulsation.

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