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THE ORBITAL PERIOD AND PHOTOGRAPHIC LIGHT CURVE OF THE ECLIPSING BINARY V 339 Per

V 339 Per was discovered by C. Hoffmeister (1967, Astr. Nachr. 289, 205) to be variable. He observed two minima at JD 2439027.52 and at JD 2439060.53 with a depth of about 2 mag and suspected the object to be an eclipsing binary. Since no orbital period has yet been determined, a total of 87 blue and additional 15 red patrol plates of a field centered at o Per has been inspected for further eclipses.

15 blue plates taken between Sept. 1961 and March 1962 were kindly placed at our disposal by the Landessternwarte Heidelberg. They were obtained with the Bruce double camera (F/5 with F = 206 cm). The other 72 blue plates were taken between Oct. 1969 and March 1976 with the astrograph (F/5 with F = 150 cm) of the Observatory Hoher List of University Bonn, the red plates between March 1976 and August 1982 with the Schmidt telescope (F/4 with F = 138 cm). Thus, this observation material covers the pretty large time interval of 21 years!

Among all the 102 observations a total of 17 new minima could be detected. The observed times of minima are given in the first column of the table.

The search for a periodic representation succeeded and revealed the following ephemeris:

$$\text{Min} = \text{JD}_{\text{hel}}\ \underset{\pm.006}{2437550.436} + \underset{\pm.000003}{1^{\text{d}}.099031} \cdot E$$

On the basis of this ephemeris epoch numbers and O-C values have been calculated and are shown in the second and third column of the table, respectively.

Table I

Minima JD 24 00000+	Epoch	O-C
37550.45	0	$0^d.014$
37562.53	11	0.005
37563.62	12	-0.004
37640.55	82	-0.007
39027.52*	1344	-0.014
39060.53*	1374	0.025
40514.54	2697	0.017
40557.35	2736	-0.035
40679.35	2847	-0.027
40858.55	3010	0.031
40915.64	3062	-0.029
41214.60	3334	-0.005
41247.58	3364	0.004
41957.56	4010	0.010
41958.61	4011	-0.039
42842.32	4815	0.050
42843.37	4816	0.001
44662.29	6471	0.024
44663.34	6472	-0.023

*Astron. Nachr. 289, 205

The standard deviation of the O-C values of ±35 minutes proved to be very satisfactory if we compare it with the limited time resolution of the individual observations given by the exposure times of mostly 30 minutes for each plate. Note that due to the relatively large time interval covered by the observations even the rather crude photographic method could fix the orbital period with an accuracy of about $3 \cdot 10^{-6}$ of the period.

In Figure 1 we present the identification of the variable together with the comparison stars used for the estimate of the light curve. The photographic magnitudes of the comparison stars are based on a transfer of a photoelectric sequence in NGC 1778 (Hoag A. A. et al., 1961, Publ. US Nav. Obs. 17, 470) into the Perseus field. Figure 2

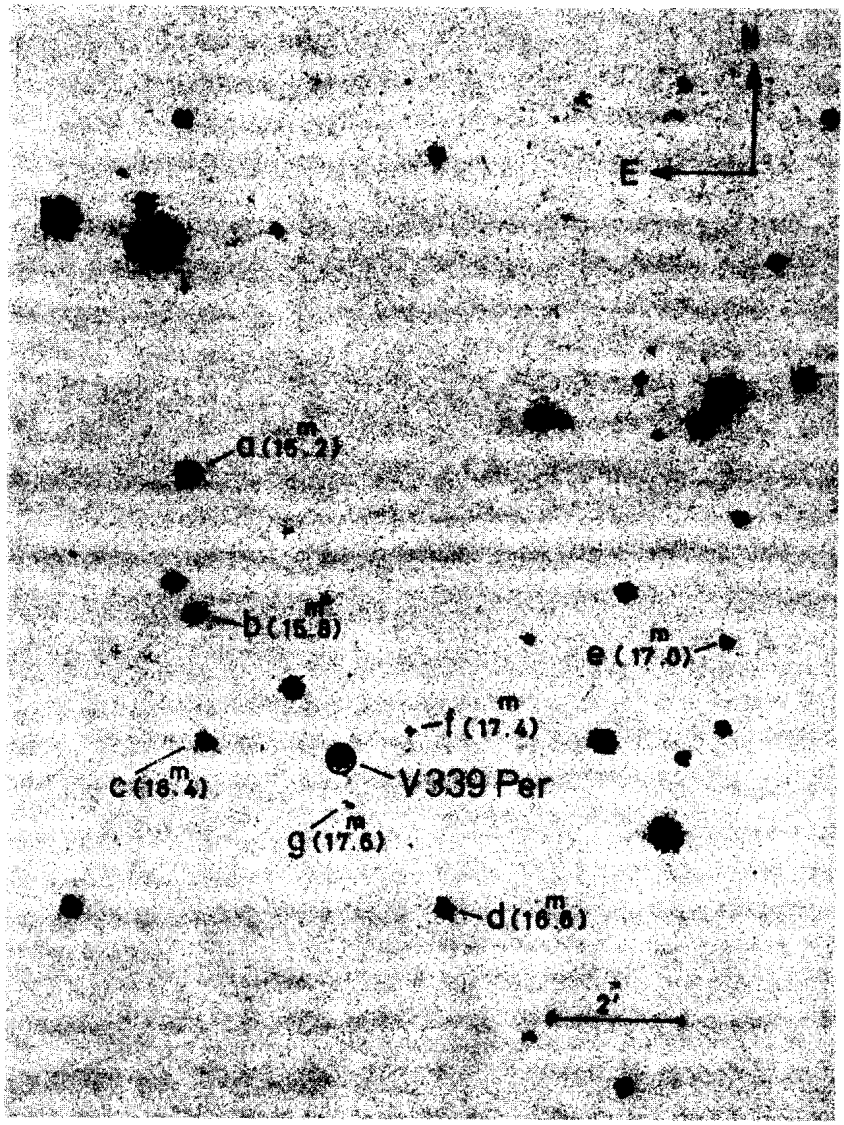

Figure 1

Identification of the variable and comparison stars.
Numbers are photographic magnitudes.

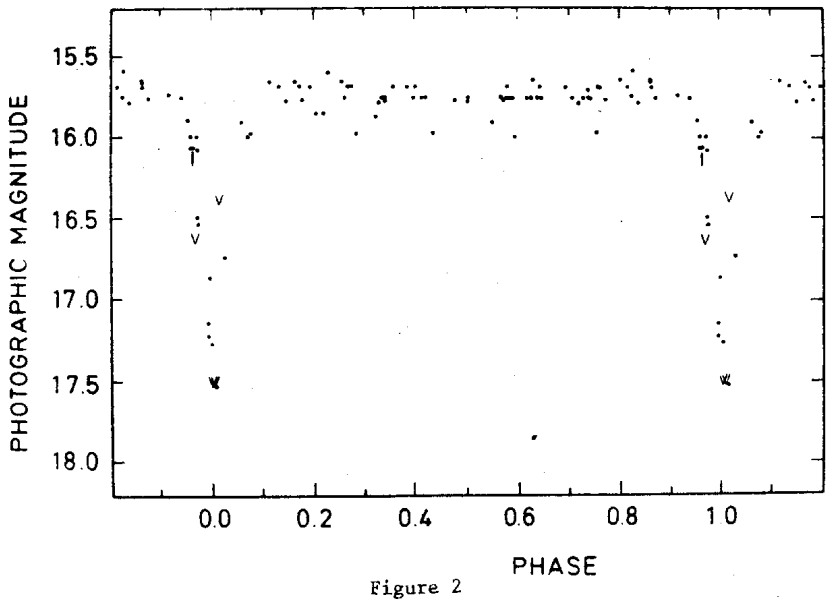

Figure 2

The photographic light curve of V 339 Per. Here a "v" stands for an observation below plate limit.-Besides the 12 clear minima, the marked observation was also seen as a conspicuous minimum and thus used for the determination of the period (E=4o11). The last 4 minima of the table were seen on the red plates.

shows the photographic light curve of V 339 Per estimated on our blue plates by the step method after Argelander with an accuracy of ± 0.11 mag at maximum light. Since in the range of the minimum the variable sometimes appears just above or even below the plate limit, some of these estimates are somewhat uncertain. The light curve is typical for normal Algol systems, no secondary minimum is indicated. The depth of the primary minimum is about 2 magnitudes, its duration about 0.12 of the period or 3 hours.

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