COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 2068

Konkoly Observatory
Budapest
1982 January 7

HU ISSN 0374-0676

THE PERIOD OF DN UMa (HR 4560): A BRIGHT ECLIPSING BINARY

In a previous communication (Giménez and Quesada, 1979) we presented photometric evidences of the variability of the brighter component of the visual binary 65 UMa (HR 4560, ADS 8347, HD 103483, SAO 43945, BD +47°1913) which is itself a multiple system of close members. One of them, appears to be an eclipsing binary.

During last year, new photoelectric observations have been carried out at the high altitude observatory of Sierra Nevada (Granada, Spain) with the same instrumental equipment. All measurements were accomplished in the Johnson's B filter except for one night when the three UBV filters were used during a primary minimum. The new data have confirmed the variability previously reported as well as the position of the eclipses allowing us to determine several times of minimum. In total, we have obtained more than seven hundred individual photoelectric estimations of magnitude referred to the comparison star HR 4561.

The times of minimum light were calculated by means of the traditional method of Kwee and Van Woerden (1956) only for those eclipses well covered along the ascending and descending branches. Two times of minimum for which the observed phases did not covered suitably well both branches, were obtained by means of a graphical procedure and consequently a lower weight was given. All observed minima are included in Table I along with the type of eclipse, the epoch and the residuals based on the adopted linear ephemeris.

Table I

No.	Hel.J.D.	Ecl.	Epoch	O-C
1	244 3936.4851	P	0.0	0.0037
2	3937.352	S	0.5	0.005
3	4249.683	P	181.0	-0.004
4	4275.6355	P	196.0	-0.0078
5	4334.4700	P	230.0	-0.0075
6	4557.7034	P	359.0	0.0020
7	4629.5218	S	400.5	0.0081

A systematic search for the period was accomplished using the method outlined by Lafler and Kinman (1965) and we were able to obtain a value close to 1.73 days. Calculating the epochs for each time of minimum, the following linear ephemeris was determined by least-squares,

$$\text{Min I} = \text{H.J.D. } 244\,3936.4814 + 1^{d}.730418\ E$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad 26 \qquad\qquad 11$$

which permits the prediction of future light minima. The secondary eclipse lies almost exactly on phase 0.5 and, therefore, the orbit can be assumed to be circular. Moreover, our observations cover the whole light curve and we were able to estimate the depth of the eclipses ($0^{m}.08$) which appear to be practically identical. The duration of these shallow partial eclipses is close to 5 hours and out of eclipse the maximum light remains apparently constant although the scatter of the measurements did not allow a definitive conclusion.

It should be finally noticed that Abt (1970) in his catalogue of radial velocities indicated the existence of a double lined spectrum for the brighter component of the visual binary 65 UMa (ADS 84347 A). Nevertheless, the presence of several close visual companions in the vicinity of the eclipsing binary, makes rather difficult to obtain radial velocity determinations free of light contamination.

A. GIMÉNEZ[1,2] and J.A. QUESADA[1]

(1) Instituto de Astrofísica de Andalucía. Apartado 2144. Granada. Spain.

(2) Departamento de Astrofísica. Facultad de Físicas. Universidad Complutense. Madrid-3. Spain.

References:

Abt, H.A.: 1970. Astrophys. J. Suppl., 19, 503.

Giménez, A. and Quesada, J.A.: 1979. Inform. Bull. Var. Stars, No. 1648.

Kwee, K.K. and Van Woerden, H.: 1956. Bull. Astron. Inst. Netherlands, 12, 327.

Lafler, J. and Kinman, T.D.: 1965. Astrophys. J. Suppl., 11, 216.