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PERIOD OF THE ECLIPSING VARIABLE NY Cep

A minimum of the large-mass eclipsing binary NY Cep (HD 217312) was measured at Hvar Observatory on J.D. 2443813. The measurements are sparse and of lower accuracy, nevertheless according to them the minimum certainly occurred considerably sooner than would follow from the period $15^{d}.2767$ by Heard and Fernie (1968). The measurements are given in Table I as differences variable minus comparison. The comparison star was HD 217035. The measurements are in instrumental b and v colours, which are close to the B and V colours of the UBV system. The equipment of the Hvar Observatory has been described by Harmanec et al. (1977).

Observations of minima of NY Cep have been published by Rao (1972), Madore and Percy (1973) and Scarfe and Barlow (1974). It is not easy to compare these data, since: 1. all are on instrumental systems, 2. measurements by Rao are presented only in a figure and his comparison star HD 218537 differs from the comparison star used in other observations (HD 217035), and 3, the out-of-minimum levels of the present data differ from those of other observations.

Rao's data will not be considered in the following discussion of the period of NY Cep. Measurements by Madore and Percy are in b colour, and our b data may be compared with them. Only the rising branch of the minimum is covered in both sets of data. The average values of the measurements out of minimum are $-0^{m}.474$ (Madore and Percy) and $-0^{m}.405$ (this paper). When the data are shifted to a common level, then the best fit is obtained for a period of $15^{d}.27569$ (difference in epochs is 173).

Measurements by Scarfe and Barlow cover a whole minimum, and no observation out of minimum is given. The data are in v colour. Since the first two of our measurements seem to fall shortly before the middle of a minimum, it is possible to overlap our v data and the data by Scarfe and Barlow. The best fit is for a period of $15^d.27575$ (difference in epochs is 125). Levels out of minima are $-0^m.332$ (Scarfe and Barlow) and $-0^m.324$ (this paper).

The main sources of error are the unaccuracy of measurements and possible variation of the minimum shape. One can estimate that each of these effects may produce an error in range of $0^d.01$ to $0^d.02$, so the resulting period should be accurate to about $0^d.0001$. The differences in colour systems cannot matter, since the spectral types of both components are identical (BO IV + BO IV) and the depth of minimum may depend on wavelength only very little.

A period may be computed also from the time of minimum by Scarfe and Barlow and the time of conjunction computed by Heard and Fernie. The result is $15^d.27616 \pm 0^d.00033$. Heard and Fernie have given a table of photoelectric measurements of NY Cep, Where they consider two of the measurements erroneous. Both are good, only the phase of the J.D. 2437901 measurement should read 12.300. A measurement by Heard and Fernie on J.D. 2437962 falls close to a minimum; in order to keep it out of minimum, the period should be $15^d.27575$ or shorter (a possible deviation about $\pm 0^d.0001$).

Using the minimum observed by Scarfe and Barlow as the zero epoch, and the period which is a kind of weighted mean of above given values, we have the elements

Time of Minimum = J.D. $2441903.8136 \pm 7 + 15^d.27575 \pm 10 \cdot E.$

This period as well as the corresponding time of the periastron passage are in the range of mean errors given by Heard and Fernie.

Table I

Observations of NY Cep (Var-Comp)

J.D. hel. 2443000+	v	b	Phase
813.241	-.200	-.292	.9973
.244	-.205	-.291	.9975
.363	-.242	-.339	.0053
.422	-.286	-.379	.0055

Table I (cont.)

J.D. hel. 2443000+	v	b	Phase
813.425	-.311	-.396	.0091
.463	-.290	-.384	.0118
.467	-.319	-.400	.0121
.493	-.320	-.404	.0138
.497	-.339	-.409	.0141
.545	-.324	-.404	.0172
.547	-.333	-.410	.0173
.591	-.324	-.396	.0202
.595	-.327	-.397	.0205
819.263	-.318	-.409	.3915
.267	-.323	-.403	.3918
.340	-.321	-.411	.3966
.343	-.322	-.406	.3967
822.258	-.323	-.407	.5876
.261	-.323	-.407	.5878

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