

PHOTOELECTRIC OBSERVATIONS OF THE ECLIPSING VARIABLE DO Cas

During the 1992 observational season we turned our attention to the eclipsing variable star DO Cas (SAO 12388), in order to check the correctness of the ephemeris reported in the literature and to obtain the entire light curve.

The photoelectric observations were carried out at the station of Capanne di Cosola (AL, Italy) for six nights spanning from August 26 to September 4, collecting a total of 573 points in the instrumental V filter. The adopted photometric device was an OPTEC SSP5 photoelectric photometer (spectral sensitivity S-5) attached to a 200 mm Schmidt-Cassegrain f15 telescope. The integration time was fixed to ten seconds per count. The adopted comparison star was HIC 1228 (SAO 23474), the check one was HD 15963 (SAO 23451). The data of the involved stars are listed in the Table 1.

We obtained 4 heliocentric times of minimum, two primary and two secondary ones, listed in Table 2. These moments of minimum have been obtained processing the data by the Minimum Entropy SOP procedure (MEMSOP, Gaspani, 1993). Table 2 shows the residuals computed with respect to the following ephemeris:

$$\text{Min.I} = \text{J.D.}(\text{hel}) \ 2433926.4573 + 0^{\text{d}}.6846661 \times E$$

listed by the General Catalogue of Variable Stars (Kholopov et al., 1985). The values of the residuals suggest that the ephemeris listed above is still valid, the phase curve obtained using this ephemeris is shown in Figure 1.

In order to recover a convenient estimate of the true signal from the noisy phased data we processed them by a signal recovery technique based on an artificial neural network implementing a multilayer perceptron according to Haykin (1994), Masters (1994) and others. The restored signal is graphed as a solid line, across the original data points, in Figure 1. The flat secondary minimum is well evident. A further analysis of our observations in view to solving the light curve and determining the orbital parameters of the binary system is in progress.

Table 1. Data of the involved stars

	RA (2000)	Decl. (2000)	V	B–V	Sp.
DO Cas (HIC 12543=BD+59°529 =HD 16506=SAO 12388)	02 ^h 41 ^m 24 ^s	+60°33' 11"	8.39-9.01	0.11	A4V
HIC 1228 (BD+59°521= HD 16088=SAO 23474)	02 ^h 37 ^m 26 ^s	+60°05' 18"	7.407 ±0.031	1.129 ±0.015	F0III
HD 15963 (SAO 23451)	02 ^h 36 ^m 12 ^s	+58°04' 32"	8.03	0.06	A2Ib

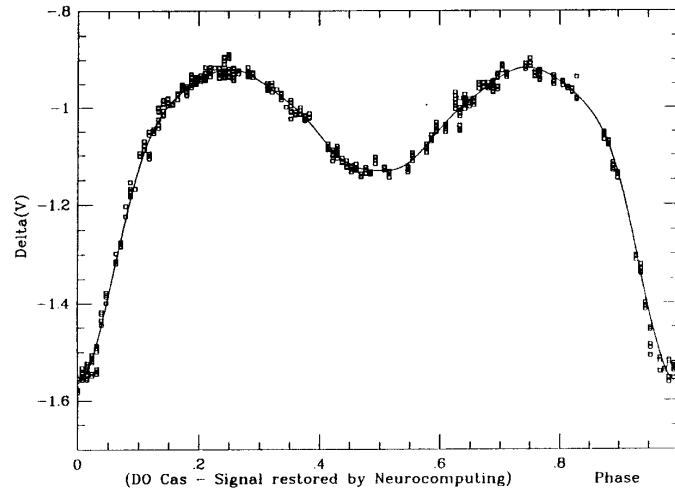


Figure 1. Photoelectric observations of DO Cas (open squares). The solid line is the signal restored by neurocomputing techniques.

Table 2. Observed times of minimum

Date	Epoch E	Times of minimum Heliocentric J.D.	Residual O-C	Type
27 Aug. 1992	21815	2448862.450 ± 0.014	+0.002	I
1 Sep. 1992	21822.5	2448867.572 ± 0.020	-0.011	II
2 Sep. 1992	21824	2448868.620 ± 0.003	+0.010	I
3 Sep. 1992	21825.5	2448869.628 ± 0.003	-0.009	II

Marco ALUIGI
GEOS - 3, Promenade Venezia,
F-78000 Versailles (France)

Gianni GALLI
GEOS - 3, Promenade Venezia,
F-78000 Versailles (France)

Adriano GASPANI
Osservatorio Astronomico di Brera
Via Brera 28, Milano (Italy)
and
GEOS - 3, Promenade Venezia,
F-78000 Versailles (France)
e-mail: gaspani@bach.mi.astro.it

References:

- Kholopov et al., 1985, "General Catalogue of Variable Stars" (GCVS), Moscow
 Gaspani A., 1993: "The algorithms useful in finding the extrema of the light curves".
 Final Report of the Second GEOS Workshop on the Eclipsing Variable Stars and
 their Data Processing", S.Pellegrino Terme (Italy), 1993, 21-22 May
 Haykin S., 1994: "Neural Networks, A Comprehensive Foundation", Macmillan College
 Publishing Company Inc., p. 498
 Masters T., 1994, "Signal and Image Processing with Neural Networks", J. Wiley, New
 York