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PHOTOELECTRIC OBSERVATIONS OF THE O+O ECLIPSING BINARY V3903 Sgr

V3903 Sgr = HD 165921 = SAO 186366 is a massive and early type (O7V + O9V; Niemela and Morrison, 1988) eclipsing binary in the R association Simeis 188 (Herbst et al., 1982) and in the open cluster Collinder 367 (Claria, 1976). The light variability and an amplitude of light variation of 0.16 mag in V was reported by Cousins (1973).

V3903 Sgr was included as part of a program devoted to observe southern close binaries. In this note we present 7 times of minimum light derived from about 160 UBVRI observations, a linear ephemeris and a partial I light curve of the object.

Observations were secured in 1989 at the Estacion Astronomica Carlos U. Cesco of Felix Aguilar Observatory (San Juan, Argentina) with the 76 cm reflecting telescope, refrigerated RCA 31034A photomultiplier and photon counting techniques. The usual symmetrical pattern was followed during the measurements through the UBVRI filters in alternative sequences variable - comparison star and sky readings. HD 166192 (B0.5V:n) in Simeis 188 was used as the comparison star while HD 165999 (A1V) was used as the check star. The mean error of an observation is 0.08 mag.

The times of minimum light were obtained analytically in the framework of Guarnieri's et al. (1975) and Kwee and Van Voerden's (1956) methods; while the minimum on JD 7752.7612 was obtained by the tracing paper method. In Table I the photoelectric minima determined here are listed together with two spectrographic determinations of Niemela and Morrison (1988). The standard errors given in parenthesis follow from the output of the analytical methods and were estimated for the rest of the minima. Cycles were determined from the elements given by Niemela and Morrison (1988).

A least squares linear ephemeris using the values listed in the Table gives

$$\text{Min I} = \text{HJD } 2445191.349 + 1.744228 * E \\ \pm .020 \quad \pm .000014$$

Weights were calculated from the formula $\text{weight} = (10 * \text{SIGMA})^{-1}$ where sigma

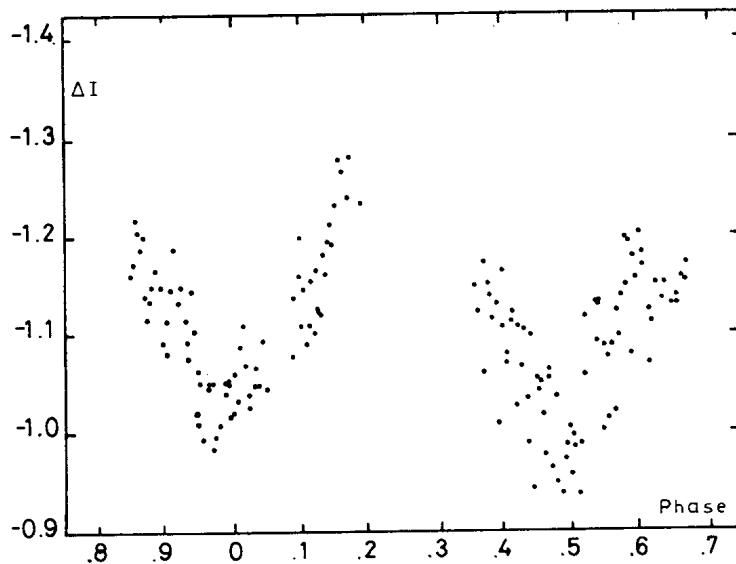


Fig. 1 Differential I light curve of V3903 Sgr

Table I
Times of minima and residuals for linear ephemeris

Min	Band	HJD(sigma)	E(w)	(O-C)
		2400000+		
II	sp	45187.0030(0.0500)	-2.5(2.0)	0.0146
I	sp	45191.3340(0.0500)	0.0(2.0)	-0.0150
II	I	47747.5311(0.0051)	1485.5(19.6)	0.0159
II	I	47752.7812(0.0050)	1468.5(20.0)	0.0133
I	U	47753.8164(0.0007)	1469.0(142.9)	-0.0036
I	B	47753.6213(0.0017)	1469.0(58.8)	0.0013
I	V	47753.8183(0.0008)	1469.0(125.0)	-0.0017
I	R	47753.8208(0.0019)	1469.0(52.6)	0.0008
I	I	47753.8204(0.0019)	1469.0(52.6)	0.0004

stands for the standard errors. The column labeled (O-C) in the table shows the departure between observed and calculated times of minimum light.

The partial light curve in I is depicted in Figure 1. It displays a high dispersion inside and outside minima. The amplitude of the minima estimated from the light curve is 0.25, a value somewhat greater than that

determined previously. The orbit of the system appears to be circular and perhaps with a high degree of contact. There is a hint that the minimum at phase 0.50 could be the primary one, but only further observations would confirm this. A rough estimate of the inclination of the orbit would be 70 degrees. Differential B-V colors between primary and secondary minima suggest that the hotter star is in front of its mate during primary minimum. Further observations of V3903 Sgr are planned. We wish to express our thanks to the Director and Staff of the Oafa.

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