

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

Number 2165

Konkoly Observatory
Budapest
1982 June 17

HU ISSN 0374-0676

THE PRIMARY ECLIPSE OF RW MONOCEROTIS IN FIVE COLORS

RW Monocerotis has long been recognized as an Algol-type eclipsing binary with a deep primary minimum due to a complete occultation. Szczpanowska (1951) discusses the extensive series of visual observations made at the Cracow Observatory between 1924 and 1949. Batten (1956, 1957) obtained orbital elements for this system using visual observations made by Dugan and Pierce and photoelectric observations made by Lenouvel. Brukalska et al. (1969) obtained an extensive series of photoelectric observations of this system in the red ($\lambda_{\text{eff}} = \text{ca. } 6800 \text{ \AA}$) and in the infrared ($\lambda_{\text{eff}} = \text{ca. } 8000 \text{ \AA}$). Orbital elements were obtained by Rucinski (1970) using these observations. These data have been subsequently analyzed by Mezzetti et al. (1980) using the Wood method.

In this investigation the primary eclipse of RW Mon was observed in five colors on two nights in January, 1982, with the 1.0 meter Ritchey-Chretien telescope of the Flagstaff Station of the U.S. Naval Observatory. The photomultiplier used was an EMI 9658R (S-20 surface) refrigerated by means of a thermoelectric cooler. The photometric system used closely resembles the UBVR system developed by Cousins (1973, 1976). The effective wavelengths of the bandpasses are as follows:

U	3550 \AA
B	4350
V	5450
R	6150
I	8100

The star BD +08^o 1400 was used as a comparison. The colors and magnitudes obtained for this star were $V = 9.53$, $B - V = +0.02$, $U - B = -0.07$, $V - R = +0.02$ and $V - I = +0.04$.

A total of 355 observations of RW Mon was obtained. These observations, corrected for light time and differential extinction, have been transformed to the UBVRI system of Cousins. They have been placed in the archives of the Royal Astronomical Society. The magnitude differences listed are in the sense RW Mon-BD +08^o 1400. The ranges of the magnitudes and depths of the primary minimum of RW Mon are as follows:

U	max. = -0.42	min. = +3.05	depth (I) = 3. ^m 47
B	-0.24	+2.68	2.92
V	-0.24	+1.98	2.22
R	-0.27	+1.55	1.82
I	-0.31	+1.20	1.51

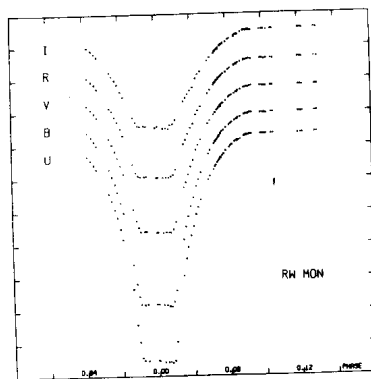


Figure 1

In Figure 1 in which the observations are plotted, each marking on the vertical scale represents 0.50 mag. The I passband used in this investigation closely resembles the one (series I) used by Brukalska et al., but their passband in the red (series II) has a much longer effective wavelength than the R band used here.

The magnitudes and colors obtained for RW Mon (HDE 259986), whose spectral type is given as A0, are as follows:

V	at maximum = 9.29	at primary = 11.51
B - V	+0.02	+0.72
U - B	-0.26	+0.30
V - R	+0.01	+0.42
V - I	+0.11	+0.75

At maximum light the colors of this system are most similar to those of a B9 star, while at minimum they closely resemble those of a G5 star. RW Mon does not appear to be significantly reddened. Thus we can regard RW Mon as consisting of components whose spectral types are B9 V and G5 IV.

The duration of the total phase portion of the eclipse was found by this investigator to be $0^d.051$ or 1^h13^m . This corresponds to a phase angle of internal tangency of $4^{\circ}82$, a value which is somewhat larger than that reported by previous investigators. For the phase angle of external tangency, however, he found a value of $27^{\circ}4$, which is significantly less than that reported by previous observers of RW Mon.

One time of minimum light was found in this investigation, JD Hel. 2444979.7733. When this is combined with the other photoelectric times of minimum light the following data are obtained:

JD 2433680.4491	E = 0	O-C = $+0^d.0010$	Batten
8443.77695	2499	-0.0004	Brukalska et al.
8445.68318	2500	-0.0002	"
9455.91152	3030	-0.0018	"
2443864.7101	5343	+0.0011	Olson
3883.7710	5353	+0.0011	"
4979.7733	5928	-0.0008	Chambliss

Using a least-squares solution in which each of these times is given unit weight the following ephemeris is obtained:

$$\text{JD Hel. } 2433680.4481 + 1^d.90609412 \text{ E.} \\ \pm \quad 6 \quad \pm \quad 16 \text{ p. e.}$$

The residuals listed above are those obtained using this ephemeris. The period of RW Mon appears to have remained constant for the past 30 years. It should be noted, however, that this period is $0^s.6$ shorter than that reported by Szczpanowska for observations made up to 1949.

This investigator wishes to acknowledge the support which he has received from a Small Research Grant awarded by the American Astronomical Society.

He also wishes to express his thanks to Drs. Harold D. Ables and Frederick J. Vrba of the U. S. Naval Observatory, Flagstaff, Arizona, for making facilities available to him at that institution.

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