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ERUPTIVE MASS-TRANSFER EVENTS IN RW TAURI

Many years of intermittent mass-transfer events in U Cephei have been observed and interpreted (for references, see Olson 1980a, 1980b). Most prominent among the photometric disturbances in U Cep was the ultraviolet light excess seen during primary eclipse, which sometimes changed the normal total eclipse to one of "partial" shape. This light has most recently been explained as an asymmetrical bulge that grows around the equator of the mass-accreting B star in response to the impact of the stream (Olson 1980b). Factors that determine the growth of the bulge include the mass-transfer rate and the contemporary (differential) rotational speed of the hot star. Such bulges were never observed in a steady-state, within the observational time resolution of a few days. We now report the occurrence of qualitatively similar photometric perturbations in the totally-eclipsing system RW Tau. Observations were obtained with the 1.0 M reflector of Prairie Observatory, using a single channel pulse-counting photometer with RCA 31034A-02 photomultiplier tube. Four-color u v b y and near infrared I_K data were obtained, and transformed to the Strömberg-Crawford and Kron standard systems; y -observations were transformed to Johnson V. Comparison star was BD +27°623 (checked and used by Bookmyer 1977), and observations of (variable minus comparison) were corrected for differential extinction.

Infrared and ultraviolet results are shown in Figure 1. Observations were obtained on five nights, and only on the first of these (UT Nov. 8 1978; squares in Fig.1) were the light curves free of contaminating light. Three times of primary minima were obtained (HJD-2440000.): 3820.7835±0.0001; 4180.7319±0.0001;

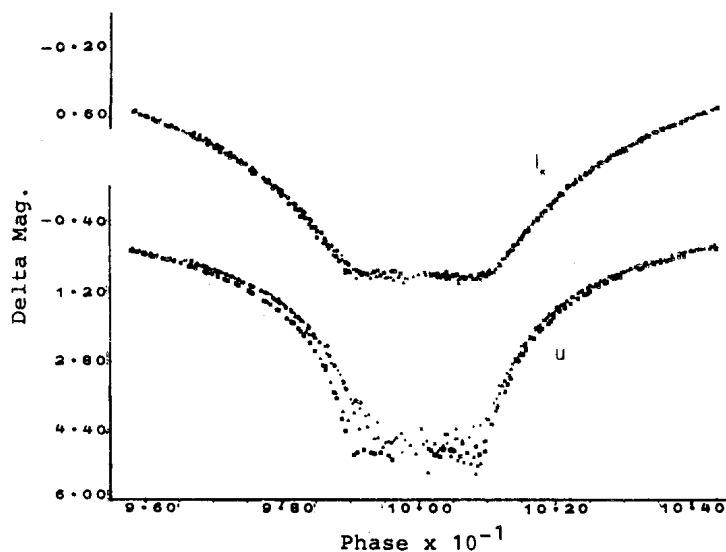


Fig. 1 - Infrared and ultraviolet light curves of primary eclipses of RW Tau. Symbols and UT dates are: square, Nov. 8, 1978; octagon, Dec. 28, 1978; triangle, Nov. 3, 1979; plus, Nov. 14, 1978; X, Nov. 17, 1979. Some of the ultraviolet scatter at minimum is due to moonlight.

4191.8074±0.0001. Infrared and ultraviolet times were omitted from the last minimum, as they were late by ~0.001 day. Light curves of Figure 1 were stacked with period 2.7688344 day.

During disturbed eclipses, excess light was present at all observed phases of primary eclipse, and can be detected even in the infrared. As with U Cep, the excess light at second contact exceeded the third contact excess; if an equatorial bulge is responsible in RW Tau, it too is asymmetrical. The maximum ultraviolet excess on the magnitude scale was ~1.2 mag on Dec. 28, 1978 (octagons in Fig.1), but the actual light excess peaked near phase 0.97 - again, similar to U Cep. These RW Tau observations differ from those of U Cep in showing no light loss during eclipse egress.

A quantitative discussion of these observations awaits the accurate measurement of comparison star colors. RW Tau may be entering an active phase, and may repay observations in the

coming season. We particularly urge interested observers to use intermediate band, rather than broad-band filters, if possible.

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EDWARD C. OLSON
Department of Astronomy
University of Illinois
Urbana, IL 61801

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