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

Number 2206

Konkoly Observatory
Budapest
1982 October 7

HU ISSN 0374-0676

MULTI-COLOR PHOTOMETRY OF V711 TAURI (HR 1099)

The photometric distortion wave of the RS CVn variable V711 Tau has changed progressively in recent years. Landis et al. (1978) and Bartolini et al. (1978) gave visual observations made in late 1976 through late 1977. Feldman et al. (1978) observed a series of intense radio bursts in early 1978, and Chambliss et al. (1978) reported visual photometry during these outbursts. Chambliss and Detterline (1979) found that by early 1979 the visual wave amplitude had increased from an earlier value of $\sim 0^{m}.08$ to $\sim 0^{m}.2$. During the summer of 1979, Feldman et al. (1979) observed additional intense radio bursts. By fall 1979, Guinan et al. (1979) observed an increase in peak brightness with an intermediate-band filter centered on Hα. In this three-year interval, the phase of minimum light, calculated with the spectroscopic ephemeris JD(hel.) = 2,442,766.069 + $2^{d}.83782E$, migrated steadily from ~ 0.55 to ~ 0.95. Blanco et al. (1980) observed dramatic changes in the 1980-81 visual light curve, in which the earlier wave was resolved into lower amplitude waves with indeterminate migration rates.

In this bulletin we give uvby (Strömgren-Crawford) and I (Kron) observations made in 1977 and early 1978. To these we add uvby observations made on five consecutive nights in October, 1981. Earlier observations were made with the 1-m Prairie Observatory reflector. Differential magnitudes, relative to 10 Tau, were corrected for differential extinction and transformed to the standard systems. They are listed in Table 1 to two decimals only, because of small uncertainties in transformation coefficients. The 1981 observations were made with the 0.4-m reflector of Mount Laguna Observatory, San Diego State University, using a digital integrating system with a dry ice-refrigerated 1P21 photomultiplier. The same filter set was used for all observations (Olson 1981). Yellow observations were transformed to Johnson V, and all observations include the close visual companion ADS 2644B.

Table I Observations of HR 1099, 1977-1978

JD(hel) 2,440,000 +	ΔI	ΔV	Δb	Δv	Δu
3373.872	1.02	1.52	1.72	2.06	2.29
3397.891	1.12	1.62	1.81	2.12	2.34
3398.809	1.04	1.55	1.75	2.09	2.32
3409.904	1.06	1.57	1.77	2.11	2.34
3413.829	1.02	1.52	1.73	2.06	2.31
3419.870	1.06	1.56	1.76	2.11	2.34
3419.902	1.08	1.58	1.78	2.12	2.35
3420.859	1.08	1.60	1.80	2.14	2.36
3423.716	1.06	1.58	1.78	2.13	2.35
3429.884	1.07	1.57	1.77	2.11	2.33
3430.836	1.03	1.53	1.73	2.07	2.30
3433.918	1.05	1.56	1.76	2.10	2.34
3434.824	1.08	1.61	1.82	2.15	2.38
3577.553	1.11	1.58	1.77	2.11	2.34

Table II Observations of V 711 Tauri, 1981

JD(hel) 2,440,000 +	ΔV[1]	Δb[1]	Δv[1]	Δu[1]
4896.863	1.499	1.714	2.058	2.303
4897.908	1.565	1.782	2.133	2.386
4898.948	1.530	1.752	2.132	2.347
4899.975	1.526	1.741	2.101	2.347
4900.824	1.561	1.786	2.131	2.381

[1]Typical mean errors: V and b, ± 0.003; v and u, ± 0.004.

Figure 1 shows ultraviolet, violet and blue light curves, with open circles representing 1977 observations. The 1981 observations, shown as filled circles, were shifted graphically to fit roughly into the 1977 curves. At these wavelengths, the 1981 observations fall fairly well onto the earlier light curves.

Figure 2 shows visual and near-infrared light curves. Here the distortion waves are slightly less well-defined than in Figure 1. The 1981 visual curve has brightened, particularly around minimum light.

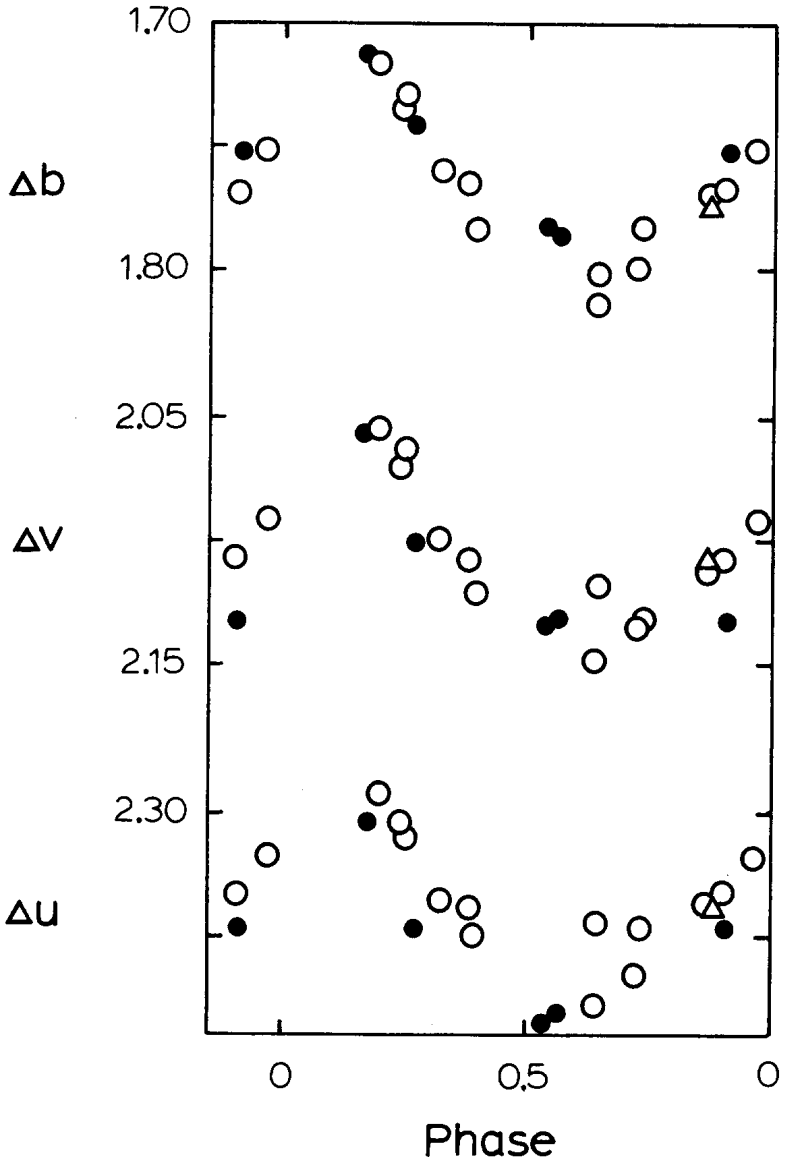

Figure 1 - Intermediate-band blue, violet, and ultraviolet light curves of V711 Tau. Open circles, late 1977; triangles, March 1978; filled circles, October, 1981.

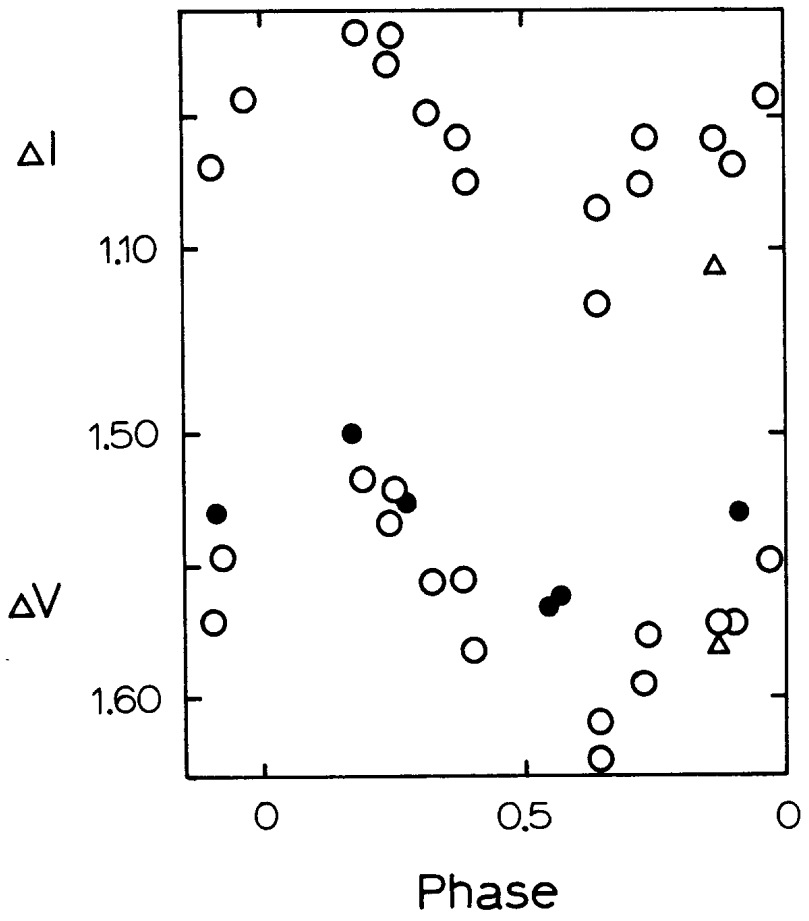

Figure 2 - Near-infrared and visual (transformed from Strömgren-Crawford y) light curves of V711 Tau. Same symbols as in Figure 1.

The last observations in Table 1 were made in March, 1978 just after the intense radio bursts but well before the light curve changes of 1979-1981. They are shown as triangles in Figures 1 and 2. Only in the infrared, and perhaps in the visual, do these points lie below the mean 1977 light curve. Chambliss et al. (1978) found a small phase shift between 1977 and 1978 visual curves, but such a shift would not remove the

infrared discrepancy. Perhaps some kind of transient effect depressed the long-wavelength light. If such disturbances were fairly common, then phase changes might be easier to determine from short-wavelength photometry.

Five times of minimum light from 1976.8 to 1979.9, extracted from publications cited above, gave the least-squares ephemeris for minimum light: JD (hel.) = (2,440,000.58 ± 0.08) + (2.840612 ± 0.000060)E. A crude time of minimum for the 1981 observations, 2,444,898.1 ± 0.3, yielded an (O-C) of + $0^d.3$ ± $0^d.3$ from this ephemeris. It is therefore possible that the distortion wave in late 1981 remained coherent with the pre-1980 wave. These data yield a wave migration period just under 8 years.

The author thanks the National Science Foundation and the University of Illinois Research Board for partial support of this work. Jay Gallagher, William Hartkopf, Richard Radick, Kenneth Yoss, David Lien, and Michael Peck assisted with observations at Prairie Observatory. The author also thanks Dr. Burt Nelson for observing time and the staff of Mount Laguna Observatory for assistance.

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