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1981 UBVR PHOTOMETRY OF RT And

As part of our long-term program of UBVR photometry of RS CVn binaries, we have observed the short-period (0.63 day) system RT And (=BD +52°3383a), which has a very peculiar light curve known since 1949 (Gordon, 1948). The observations spanned the time from September to November 1981 and were made with the University of New Mexico's 61-cm Capilla Peak Observatory telescope. A single-channel, photon-counting system with a cooled (-20°C) EMR 641A phototube was used; the filters were from Kitt Peak. The star BD +52°3383 (SAO 35204) was the comparison for all observations, which are reported in the <u>instrumental</u> UBVR system.

Figures 1-4 summarize the results. The data have been folded so that both primary and secondary eclipses are clearly visible. The statistical error in any point is ±0.01 magnitude or better. Phases were calculated using HJD=2441508.5550 +0.62892990E (Mancuso et al., 1978). Table I provides a log of the observations.

RT And has been well observed since 1949 (see the summary of light curves in Milano et al., 1981). It exhibits complex, variable behavior, such as sudden changes in period (Williamon, 1974), a pronounced asymmetry in secondary eclipses (Dean, 1974), and a variable level of intensity outside of eclipses. Our data reinforce the long-term nature of this erratic behavior. Specifically, we can compare our V-light curve (Figure 3) to those from 1949 to 1978 (Milano et al., 1981). We note: (1) a large asymmetry in the secondary eclipse, (2) statistically significant fluctuations during ingress to secondary minimum, (3) continued symmetry in the primary eclipse, and (4) changes in outside-eclipse intensities by as much as 0.1 magnitude over a period of only two months. These latter variations are so large that a combined light curve has noticeable jumps in it (see Figure 3 near phase 0.3 and 0.6).

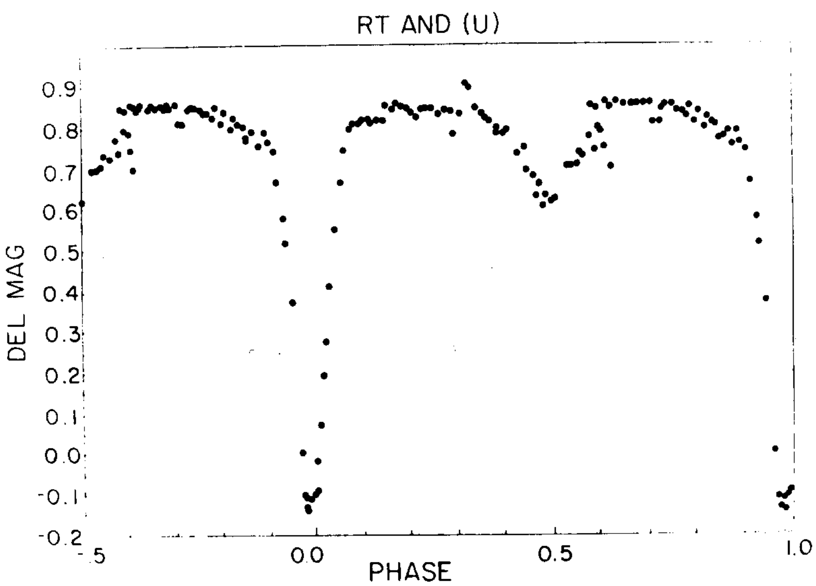

Figure 1

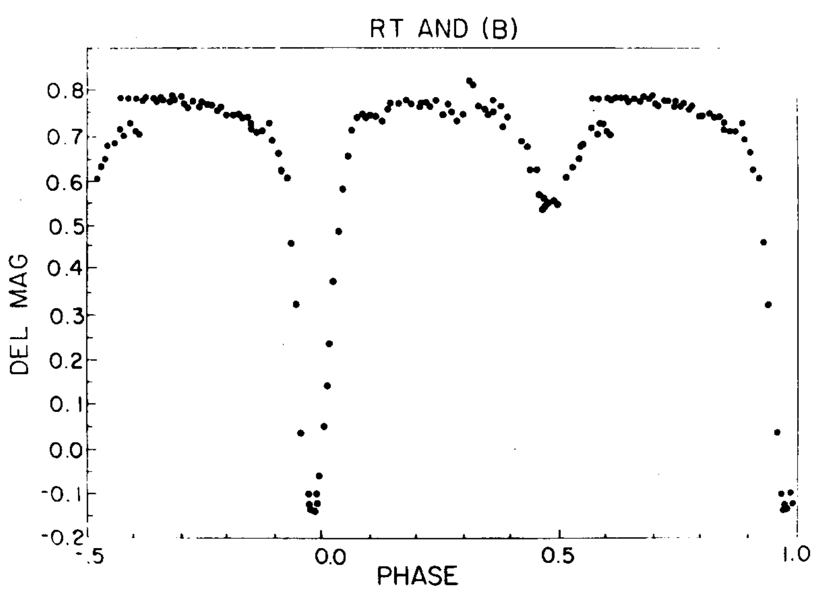

Figure 2

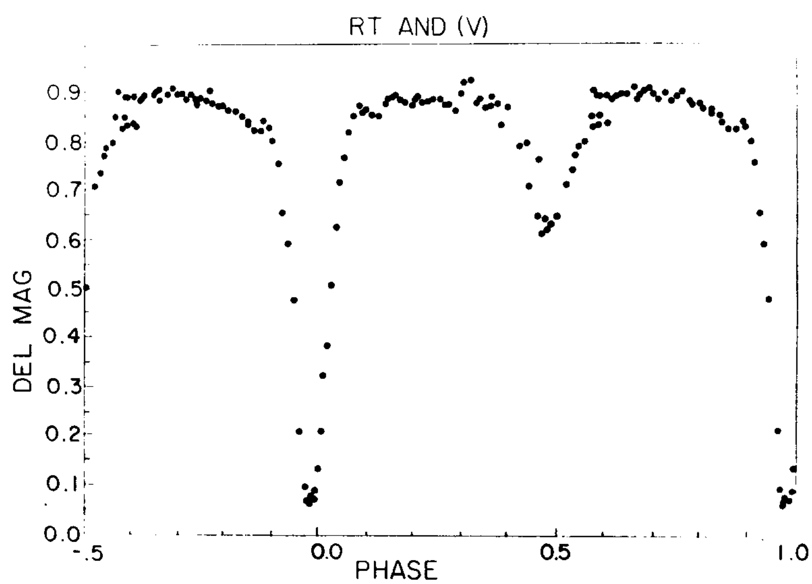

Figure 3

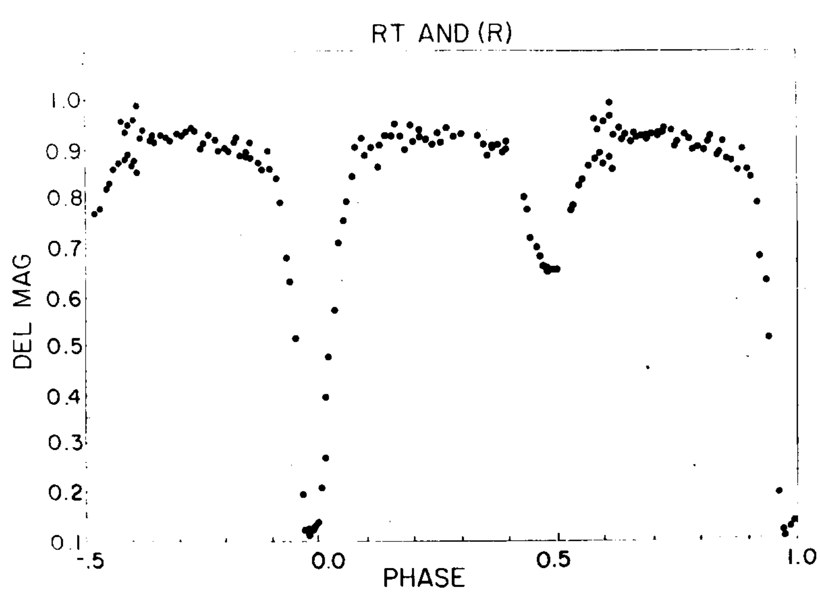

Figure 4

Table I - Phase Log of RT And

Date (UT)	Phase
9/20	0.19→0.36
9/27	0.47→0.62
10/17	0.85→0.50
10/26	0.37→0.50
11/16	0.58→0.86

As noted by Milano et al. (1981), the distortion wave has a small amplitude and a period of about 22 years. The wave was most apparent in 1974, with a peak at about phase 0.24. The phase of maximum amplitude of the wave has been decreasing; a linear fit to the rate indicates a peak at about phase 0.0 in 1981, which unfortunately coincides with the primary eclipse. Hence, it is not readily visible in our light curve.

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