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1991 BVR PHOTOMETRY OF CG CYGNI

We are continuing our long-term program of photometry of chromospherically-active, short-period binary stars with a new epoch for CG Cygni (= BD +34°4217 = #142 in the catalog of Strassmeier *et al.* [1988]). Our earlier observations in 1989 (Beckert *et al.*, 1989 and Beckert *et al.*, 1991) showed peculiar, short-term, small-amplitude fluctuations imposed upon the eclipsing light curve and maculation wave. Such irregularities outside of eclipse are visible also in the 1990 BV light curves of Dapergolas *et al.* (1991) and those from 1989 (Dapergolas *et al.*, 1989).

We carried out our observations with the 61-cm telescope at Capilla Peak Observatory equipped with a Photometrics CCD camera (Laubscher *et al.*, 1988). We used this system as a multichannel photometer to sample sky, variable, and the comparison star simultaneously. Our filter set (Beckert and Newberry, 1989) is matched to Johnson at B and V and Kron-Cousins at R. Typical exposures were 15-20 seconds at R, 30-40 seconds at V, and 60-70 seconds at B. These provided a typical S/N of about 400. Our comparison star is Yü's (1923) star (a), not BD +34°4216 used by single-channel observers. The observations were made on the nights of June 8, 18, 21, 24, and 27, 1991 (UT).

Figures 1-3 show the delta magnitudes in the instrumental system, which are very close to standard magnitudes. Figure 4 shows a 2-spot information optimization limit (Budding and Zeilik, 1987) fit to the distortion wave at V-band. We have assumed  $T_1 = 5300$  K,  $T_2 = 4600$  K, and  $i = 82.8^\circ$  to make these fits with black ( $T = 0$  K) spotted regions. The derived starspot parameters were: longitude =  $46^\circ \pm 14^\circ$ , radius =  $5.6^\circ \pm 1.4^\circ$  for spot #1 and longitude =  $238^\circ \pm 11^\circ$ , radius =  $6.9^\circ \pm 1.3^\circ$  for spot #2. Both spots were fixed at a latitude of  $45^\circ$ .

CG Cygni Instrumental B-Band  
June 1991 - Capilla

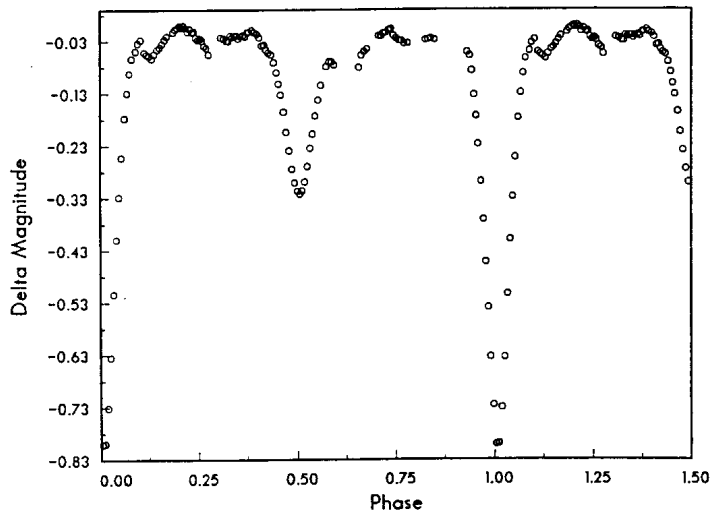


Figure 1

CG Cygni Instrumental V-Band  
June 1991 - Capilla

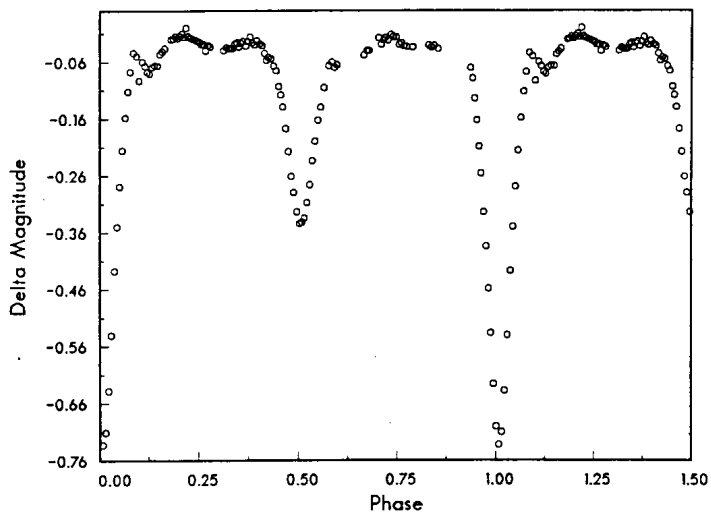


Figure 2

CG Cygni Instrumental R-Band  
June 1991 - Capilla

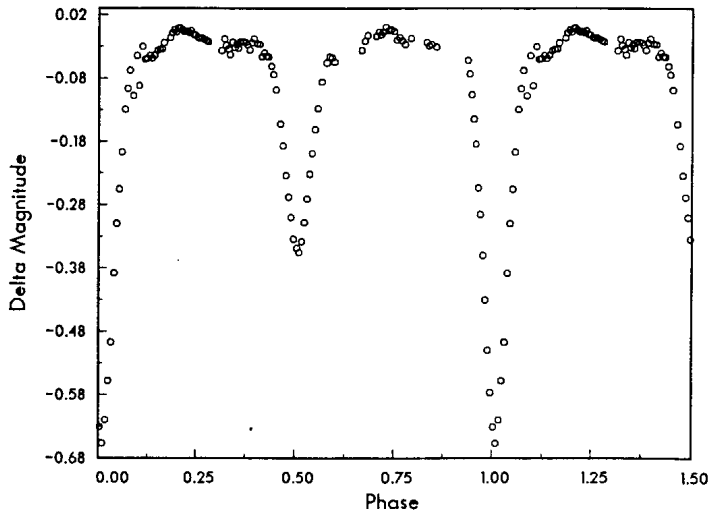


Figure 3

CG Cygni V-Band  
2 Spot Fit

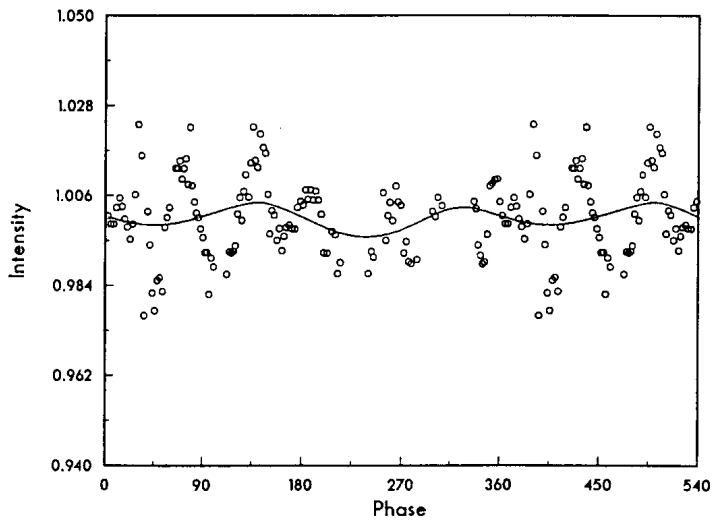


Figure 4

The short-term fluctuations are clearly visible again at all wavelengths. (We carefully monitored a subset of the instrumental magnitudes of the comparison star; they did not show any periodic variations. We were also careful to keep the star images on the same pixels from night to night.) About five peaks are visible in the data at B-band; they are roughly equally-spaced in phase. This gives an approximate period of 3 hours. The features are unlikely caused by very small spots, for their amplitudes are too large and widths too narrow for black, circular spots on either component. We are hard pressed to come up with a physical explanation; gaseous matter between the components would not explain the periodic nature of the effect.

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