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1990 BVR PHOTOMETRY OF XY UMa

The close binary XY UMa (= + 55° 1317, SAO 27143) is No. 69 in the catalogue of chromospherically active binaries of Strassmeier *et al.* (1988). Geyer has made synoptic optical observations since 1955. From coordinated x-ray and optical observations, Bedford *et al.* (1990) concluded that the G primary star emits the soft x-ray flux, which showed a clear primary eclipse. The coronal plasma has an enhanced component on the side facing the primary star; a photospheric active region underlies a similar span in longitude. With the launch of ROSAT, new x-ray observations are possible for XY UMa. Consequently, we have decided to continue our optical photometry at Capilla Peak Observatory (CPO).

Our new observations were done on the nights of March 3 and 4 and April 16, 1990 UT. We followed a similar procedure as for our 1988 data (Zeilik *et al.*, 1988), except that we have a new filter set (Beckert and Newberry, 1989) for our CCD system (Laubscher *et al.*, 1988). The effective wavelengths are: *B*, 438.5 nm; *V*, 559.4 nm; and *R*, 680.4 nm. We used Geyer's comparison star (SAO 27139). The observations were reduced with a software mask with a diameter of 20 arcsec. Exposures were chosen so that S/N > 100. Phases were calculated from the ephemeris in Strassmeier *et al.* (1988).

Figures 1 through 3 give the *B*, *V* and *R* delta magnitudes in the instrumental system. In Figure 4, we compare the observations (open circles) to an eclipsing binary model fit (solid line), following the procedures of Budding and Zeilik (1987); the units are normalized intensity. The difference between these two curves defines the distortion wave for the system at this epoch. We then applied a circular, black (T = 0) spot model to the distortion wave. We found that the data were not precise enough to extract a determinate solution for latitude in a four-parameter fit. Therefore, once we found a preliminary longitude value, we fixed this parameter and searched χ^2 solution hyperspace for a latitude

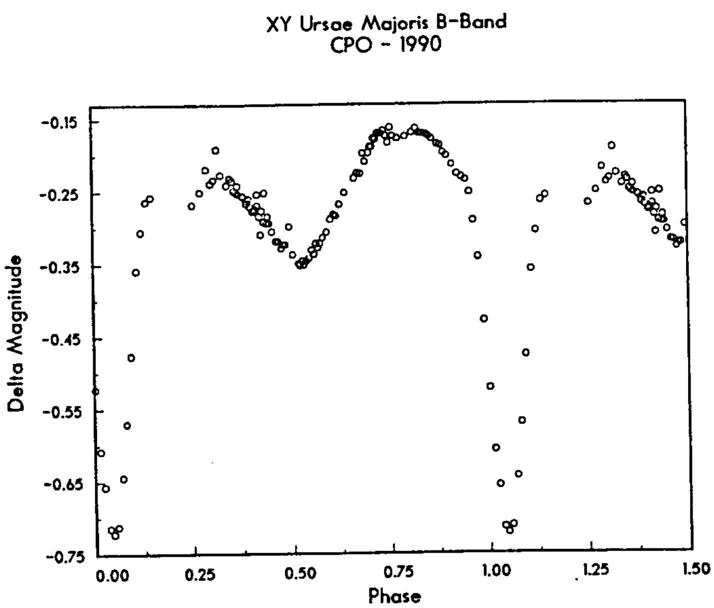

Figure 1

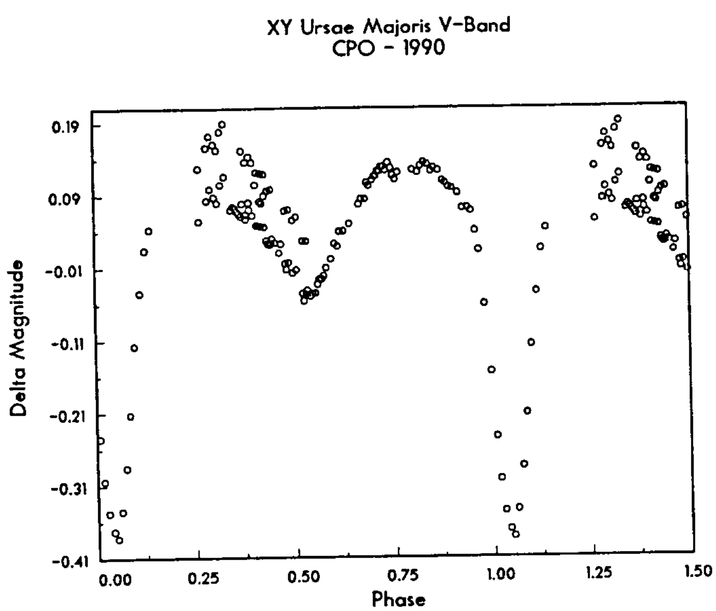

Figure 2

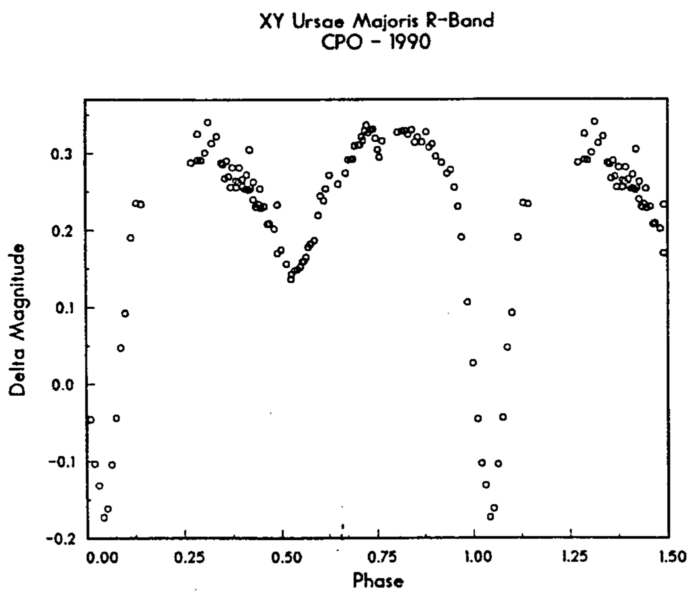

Figure 3

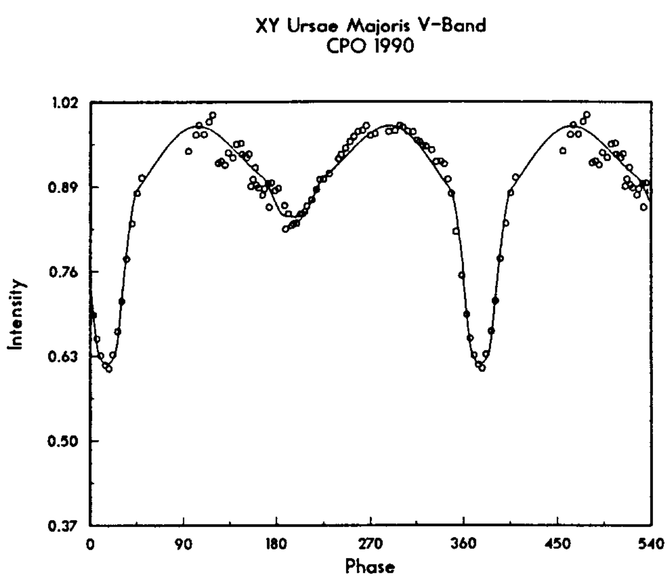

Figure 4

value. We found a value of near 45 degrees at *V* band. We then fixed the latitude at 45° and found the following spot parameters:

Wavelength	Longitude	Radius	χ^2
B	113°±5.2°	15.9°±0.7°	93.8
V	108°±14°	8.9°±1.0°	182.4
R	126°±7.4°	12.2°±0.6°	110.5

We attempted to use the *V* and *R* observations to calculate a spot temperature; however, the overall errors (± 0.04 intensity units) were too large to do so. After our fits with one spotted region, we "cleaned" the original light curves of the maculation effects and attempted to find another active region. We were unable to find another one.

In our 1987 data (Heckert and Zeilik, 1988), we found one spotted region at a longitude = 269°±6°, a latitude of 40° ± 36°, and a radius of 9.2° ± 4.0° at *V* band. These fell into the active longitude belt near the 270° quadrature longitude. In 1990, we now have the active region in the active longitude belt near 90°, which upholds the trends for the short-period systems. Their primary activity signature involves a switching of activity between the two active longitude belts.

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