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A NEW ECLIPSING VARIABLE IN THE BX PEGASI FIELD

A new eclipsing variable star has been discovered near BX Peg during a study of this W UMa type star, DeYoung et al., (1991). The U. S. Naval Observatory 0.61-meter Cassegrain telescope at Washington, DC and a Metachrome-II coated Thomson CSF THX31156 1Kx1K CCD was employed in a program to determine times of minima of eclipsing variable stars. A "wide red" (H alpha-H beta-calcium) filter was used for 701 images and "v" (GG495(2.6mm) + BG39(1.8mm)) was used for 28 images.

The DAOPHOT photometry package, Stetson (1987), was used in synthetic aperture mode for five of the brightest stars in the CCD field. On the first night the light curve of BX Peg was skewed. The brightest comparison star was determined to be variable. A search of the *General Catalogue of Variable Stars* (1985), *The New Catalogue of Suspected Variable Stars* (1982) and the various *IBVS* issues published since 1985 revealed no object corresponding with the new variable. Subsequent observations revealed variations that confirm an Algol type eclipsing variation. Differential instrumental magnitude light curves were constructed for each night's run. The method of Kwee and van Woerden (1956) was used to determine the times of well observed minima (see Table 1). Using the four well observed minima and four partially observed minima, an estimate of the period yielded a value of 0.816 days. A period search using a discrete Fourier transform method based on Scargle (1982) and a Jurkevich search method based on Morris and DuPuy (1980) proved to be inconclusive, with the 0.816-day period only weakly indicated. A trial of all other suggested periods in the periodograms showed that no other period fit the data. A linear least squares fit to the four well observed minima gives the following preliminary ephemeris.

$$\text{JD Hel Min I} = 2448158.5675 + 0.816384 * E \quad (1)$$

$\pm 11 \qquad \pm 19$

The following data were found in the *Space Telescope Guide Star Catalog* (CD ROM Version 1 issued on 1 June 1989) on the new eclipsing variable.

| Right Ascension (J2000.0) | Declination (J2000.0) | m _v |
|---|-----------------------|----------------|
| 21 ^h 39 ^m 10.7 ^s | +26° 42' 34" | 12.07 |

Table 1. New observed epochs of primary and secondary minimum fit to Equation 1.

PRIMARY MINIMA

| Filter | HJD | Mean Error (Days) | Cycles | O-C (Days) |
|------------|--------------|----------------------|--------|---------------|
| "wide red" | 2448158.5685 | 0.000358 | 0.0 | -0.0010 |
| "wide red" | 2448225.5122 | 0.000276 | 82.0 | -0.0012 |
| "v" | 2448225.5099 | 0.000697 | 82.0 | 0.0012 |

SECONDARY MINIMUM

| Filter | HJD | Mean Error (Days) | Cycles | O-C (Days) |
|------------|--------------|----------------------|--------|---------------|
| "wide red" | 2448160.6075 | 0.000409 | 3.5 | 0.0010 |

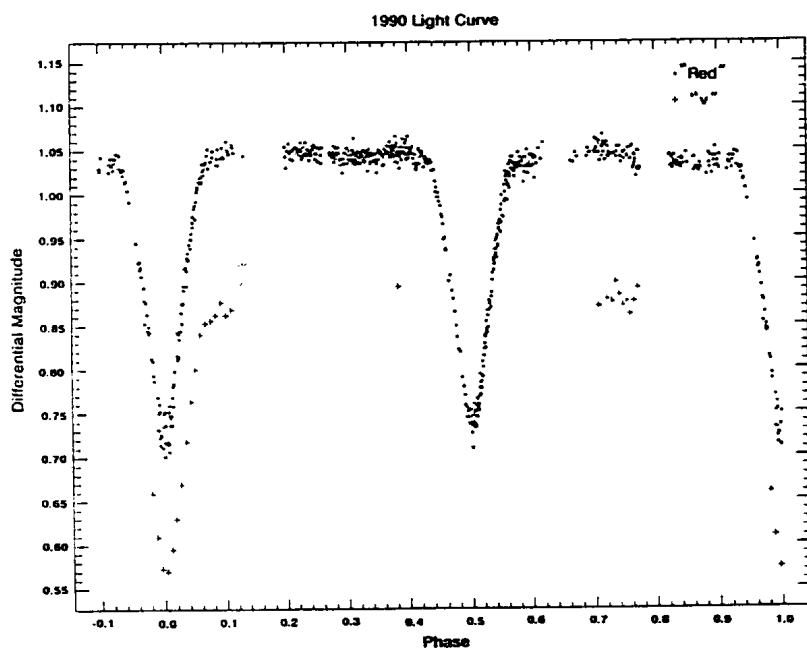


Figure 1

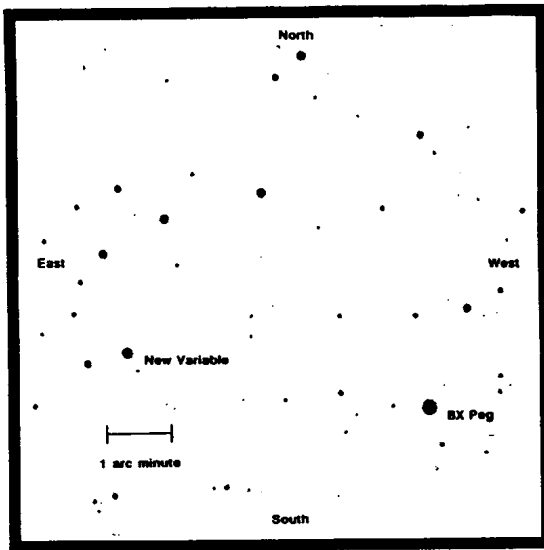


Figure 2

The magnitude at maximum is 12.1 in the "v" filter, determined by differential measures with respect to BX Peg when both the new variable and BX Peg were at maximum. Our maximum magnitude agrees well with the data from the *Guide Star Catalog*. The observed instrumental amplitude of primary minimum is 0.31 in the "v" filter. Figure 1 shows the instrumental differential "wide red", indicated by small boxes, and "v" magnitudes, indicated by plus symbols, versus phase computed using Equation 1. Figure 2 is a "wide red" image finder chart for the new variable. Table 1 gives the times of primary and secondary minima found in this study reduced to Equation 1.

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