OPTICAL VARIABILITY IN SAO 20517 AND ITS
POSSIBLE IDENTIFICATION AS AN X-RAY SOURCE

During a recent campaign to observe the massive eclipsing binary system HD 219634 the field star SAO 20517 ($\alpha_{(2000)}$=23^{h}15^{m}30^s, $\delta_{(2000)}$=61°52') was used as one of 3 comparison stars. These observations reveal that SAO 20517 is variable with a variation of about 0.06 mag in the V passband. Figure 1 illustrates the photometric variation with respect to SAO 20532 during a two month period from July 1994 through August 1994. Figure 2 shows the same data phased with a period of 15^{d}864. The star SAO 20532 ($\alpha_{(2000)}$=23^{h}16^{m}48^s, $\delta_{(2000)}$=61°48') has been used as the principal comparison star and SAO 20526 ($\alpha_{(2000)}$=23^{h}16^{m}42^s, $\delta_{(2000)}$=61°41') as a check star in these observations. Data have thus far been obtained using The King's University College Observatory CCD photometer on a 0.2 m telescope and the University of Alberta, Devon Observatory two-channel photometer attached to the 0.5 m telescope. The data, as presented have not been transformed to the standard UBV system.

SAO 20517 may be an x-ray source. It can be tentatively identified with the final source listed by Helfand and Caillault (1982), and coincides with a weak, unresolved source on plate 7-434 of "The Eistein Observatory Catalog of IPC X-Ray Sources". Bidelman (1994, private communicatio) suggests a spectral type of K0IV based on examination of a contaminated spectrum on an objective prism plate. This, and the light curve shown in Figure 2 lead us to suggest that SAO 20517 is either an RS CVn or ellipsoidal binary system. The relatively high incidence of transient x-ray source at high galactic latitude (Garcia et al., 1980) lends credence to the suggestion that SAO 20517 is an RS CVn
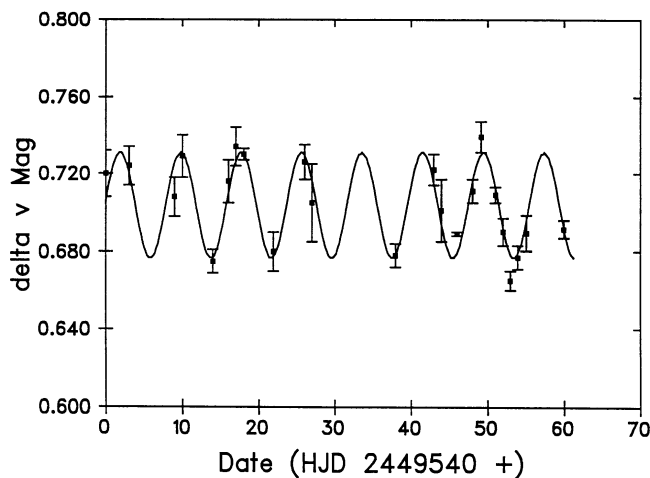

Figure 1.
V filter light curve for SAO 20517 covering a two month span. The solid curve represents a simple sinusoidal fit to data. Observations made on TKUC CCD and 0.2m reflector.
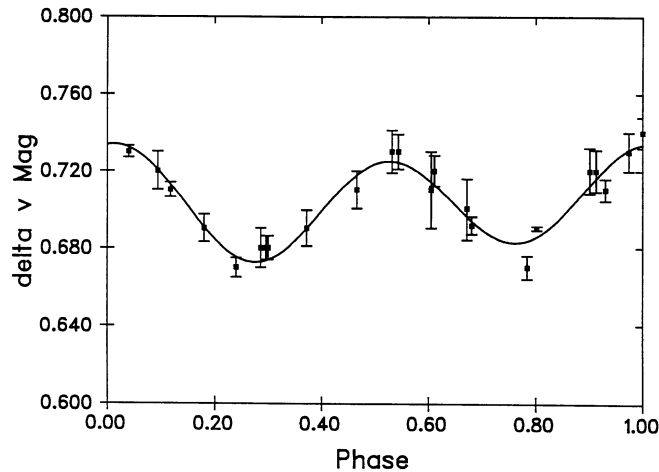
Figure 2. Light curve of observation shown in Figure 1 phased with a period of 15.864 days. Solid line shows the fit provided by the sum of the first four Fourier components.

system. At the same time evidence of ellipsoidal variation is provided by a least-squares fit of the first 4 Fourier components to the light curve. The variation can be described via:

$$\Delta v = 0.7045 - 0.0043\sin(\theta) + 0.0064\sin(2\theta) + 0.0064\cos(\theta) + 0.0251\cos(2\theta)$$

when Δv is represented as a function of phase (θ). The standard error in the Fourier coefficients is on the order of 0.002 mag. The residual error in the Fourier fit is approximately 0.007 mag which is typical of the scatter in the observations. The dominance of the $\cos(2\theta)$ term supports the suggestion that SAO 20517 is an ellipsoidal binary system.

The authors are obtaining additional multicolour (UBVR) photometric data. Spectroscopic data are being obtained Dominion Astrophysical Observatory, Victoria. A complete discussion of this system will be published elsewhere. We thank Dr. W. Bidelman for a very informative discussion about this star and related matters.

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