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V397 Per IS MOST PROBABLY NOT VARIABLE

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V397 Per is the fainter component of the double star ADS 2859. The partner is X Persei which is 6 magnitudes brighter than V397 Per, situated at an angular distance of only 22 arcsec, and itself variable. Traditional photometric techniques, be it photography, photoelectric aperture photometry or visual estimates can thus be used for V397 Per under great difficulties only. In GCVS (1987) the star is said to vary between 11.67 and 12.40 mag in V, i.e. by 0.73 mag. It is classified as "Lb:", but apparently this classification is based on just a few measurements, made with very different instruments (see Haupt and Moffat, 1973). The SIMBAD database does not contain any information on the star.

These are the reasons why we started observing the object with an "ST6" CCD camera mounted to an 8-inch Schmidt-Cassegrain telescope at Marl, Germany. No filters were used. The CCD covers a broad optical wavelength band, ranging from about 4000 to 9000 Angstroms. From November 1992 to April 1994 a total of 179 images were taken, usually in groups of 3, with exposure times of 10, 30 and 60 seconds respectively. Two neighbouring 12th-magnitude stars were used as reference, and six fainter ones were used as check. The 10 second exposures gave smallest scatter, probably due to the minimization of image overlap with X Persei.

Over the 1.5 year observing period V397 Per showed no brightness variations beyond the uncertainty of our measurements. The rms scatter of the 62 10-second measurements is 0.053 mag. Subtracting the estimated measurement errors one finds that the rms scatter of the true magnitudes of V397 Per is smaller than 0.04 mag over the observing period. This is very small compared to the range of 0.73 mag given in GCVS.

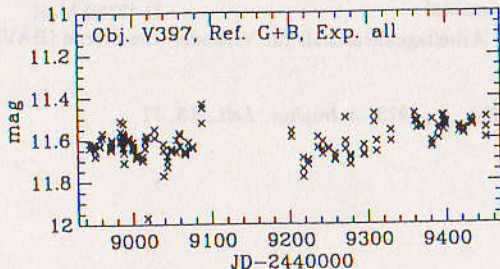


Figure 1: CCD light curve of V397 Per.

All 179 measurements are shown. Magnitudes are given with an arbitrary zero point, defined by the GSC magnitudes of a few surrounding stars. The rms scatter of the points around their mean value is 0.068 mag. Three nights are somewhat affected by cirrus (JD 2449018, 2449088 and 2449271). On JD 2448988 a long series of exposures was taken to exclude rapid variations.

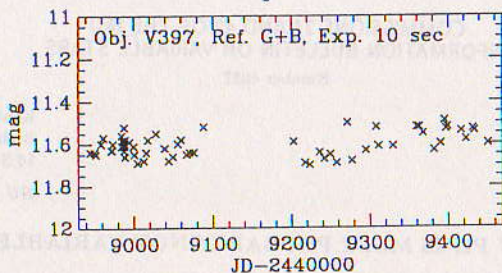


Figure 2: CCD light curve of V397 Per.

Only the 62 10-sec exposures are shown. The rms scatter of the points around their mean value is 0.053 mag. This implies an rms variation of the star of less than 0.04 mag.

There are two statistically significant indications of variability in the light curves shown in Figures 1 and 2. The first is an increase of the mean brightness after JD 2449360 by about 0.07 mag. This increase is significant at the 6 sigma level in Fig. 1, and at the 5 sigma level in Fig. 2. But it nicely coincides with an increase in the mean brightness of X Per, as derived from the online database of visual observations of the Association Francaise des Observateurs d'Etoiles Variables (AFOEV) at Strasbourg. Thus we regard it as due to a very small image overlap with X Per.

Second, an autocorrelation analysis of the data showed a periodicity with approximately 30 ± 3 days. It is marginally significant at the 0.1 percent level (it is vaguely visible to the eye in the left part of Fig. 1). The corresponding sinusoidal amplitude would be of the order of 0.03 mag. However, direct light curve fitting and period search did not give positive results. This means that any oscillations of the star, if real, could not be coherent over the 1.5 years time span.

Our observations clearly exclude variability with an amplitude of the order of 0.7 magnitudes. There is a remote possibility that we caught a particularly quiescent phase of an Lb type variable. But it is much more likely that the variability reported by Haupt and Moffat (1973) and in GCVS is spurious, i.e. due to image overlap with close-by bright X Per. We suggest that V397 Per be classified as constant. Occasional checks on the star over the next few years will be used to strengthen this conclusion.

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