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LIGHT CURVES OF CANDIDATE PRE-CATACLYSMIC BINARIES

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We present the results of time-series photometry for a sample of candidate pre-cataclysmic variables.

The observations were conducted on 2002-09-17 to 22, 2002-10-16 to 22, 2003-04-08 to 11, 2003-05-13 to 16, and 2003-06-18 to 21, at the 90 cm telescope at CTIO, Chile, using a 2k×2k CCD and a Johnson R filter. Additionally, data for the three targets LBQS 1144+0111, LBQS 1232+1335, and LBQS 1327−0242, were obtained in service mode at the 1.3 m CTIO telescope with ANDICAM. The latter observations consisted in a series of ∼2 h runs for each object on five consecutive nights, also in R.

Aperture photometry for all stars on the field was computed using IRAF's daophot package and the standalone daomatch and daomaster routines (Stetson 1992). Differential light curves for different aperture radii were established for two stars on the field with brightness similar to the target to determine the radius that yielded the least overall scatter. The average comparison light curve for the target was confined to two or three stars in the immediate vicinity (within $3'$) to minimise external variability.

The period analysis was performed using the Scargle (Scargle 1982) and analysis-of-variance (Schwarzenberg-Czerny 1989) algorithm as implemented in ESO-MIDAS. All significant peaks in the periodogram were examined for the appearance of the resulting phase-folded light curves.

In the following we list the results of our analysis.

Periodic variability:

Note that for all these systems but LTT 560 a distinction between a sinusoidal orbit (reflection effect, $P = P_{\rm orb}$) and an ellipsoidal one (deformed secondary, $P = \frac{1}{2}P_{\rm orb}$) is not possible with the current data sets and needs further observations.

LTT 560: ellipsoidal variation with a period $P =$ 3.54 h and an amplitude $\Delta m \sim 0.07$ mag. The two maxima differ in strength, which indicates a non-uniform light distribution in the system, e.g. due to star spots or already ongoing accretion.

EC 12477−1738: sinusoidal variation with a most probable period P = 13.7 h and $\Delta m \sim 0.04$ mag. The data sets are barely overlapping in phase, so that this value is very uncertain.

EC 13349−3237: asymmetric sinusoidal variation with P = 11.26 h and $\Delta m \sim 0.07$ mag, indicating that it is not exclusively due to a reflection effect.

EC 14329−1625: sinusoidal variation with a most probable period P = 4.54 h and $\Delta m \sim 0.04$ mag. The periodogram shows a strong alias at 8.17 h, but this does not yield 0.5 phase difference between maximum and minimum.

Possible, but not yet confirmed variability:

HE 0331−3541, WD 0347−137, LBQS 1327−0242, EC 20220−2243: light curves are very unclear, mainly due to unfortunate weather conditions.

BPM 46460: probably variable with $P > 8$ h and an amplitude $\leq$0.03 mag.

P83l−57 (Ret1): probably variable with $P > 12$ h and an amplitude $\leq$0.03 mag.

No, or irregular, variability:

LBQS 1144+0111, PG 2357+125: no variability was detected.

PG 1123+189: BVRi photometry showed this system to be a close visual binary with a blue and a red component.

LBQS 1232+1335: similar to PG 1123+189, but here we have observations in one filter only, thus lacking the colour information on the components.

RX J0458.9−6628: three light curves of ∼3 h each showed the system to have both long-term and (erratic) short-term variability, the latter making it unlikely to be a pre-CV.

EC 13198−2849: here, three light curves of ∼3 h showed only erratic short-term variability. The variations look stochastic, but are actually larger than for comparison stars with similar or even lower brightness. Probably no pre-CV.

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