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ECLIPSING BINARIES DISCOVERED ON STARDIAL IMAGES

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The Stardial system, run by the University of Illinois at Urbana-Champaign (McCullough and Thakkar, 1997), has been found useful for the discovery and follow-up of long period variables. This paper however reports on the discovery of ten short period eclipsing binaries on the images from this system.

The procedure used to reduce the images to star and magnitude lists was described by Wils (2003). For some stars 250 data points were obtained. For the brightest stars (mag. < 10), an internal accuracy of 0.03 mag could be obtained, depending on the quality of the night. For stars with more than 100 observations, the PDM technique (Stellingwerf, 1978) was used to search for periodic variability.

Since Stardial images are always taken when the region crosses the meridian, strong aliasing is present, and in fact it is impossible to distinguish between the genuine period and its aliases. The stars so discovered were then verified using the ASAS-3 archive (Pojmanski, 2002), which aided in establishing the correct period. Some of the stars were also followed for one or more nights at Rolling Hills Observatory (see Dvorak 2003 for a description of the instruments used). For three of the stars, V and I data were also available from the TASS Mk III survey (Richmond et al., 2000). For four others limited unpublished data from the TASS Mk IV data (Droege, 2003) provided further confirmation of the variability and the period.

The new eclipsing binaries are presented in Table 1. The first column gives the identification of the objects (HD, BD or GSC number). The following columns contain the type of variability, the epoch of minimum, period (in days) and the V range derived from the ASAS-3 database.

Phased light curves of these stars are presented in figures 1 and 2, with V data from the ASAS (open squares) and TASS (filled circles) surveys, and from Rolling Hills Observatory (crosses). The Stardial data (dashes) are taken through a non-standard red filter, and their zero-point was shifted to be in agreement with the available V data (which means that the amplitude may differ).

Acknowledgements: This research has made use of the SIMBAD and VizieR databases operated at the *Centre de Données Astronomiques (Strasbourg)* in France. The authors would like to thank Michael Richmond for providing the XVista and match programs to reduce the Stardial images. The Stardial, TASS and ASAS teams are acknowledged for providing public access to their archives.

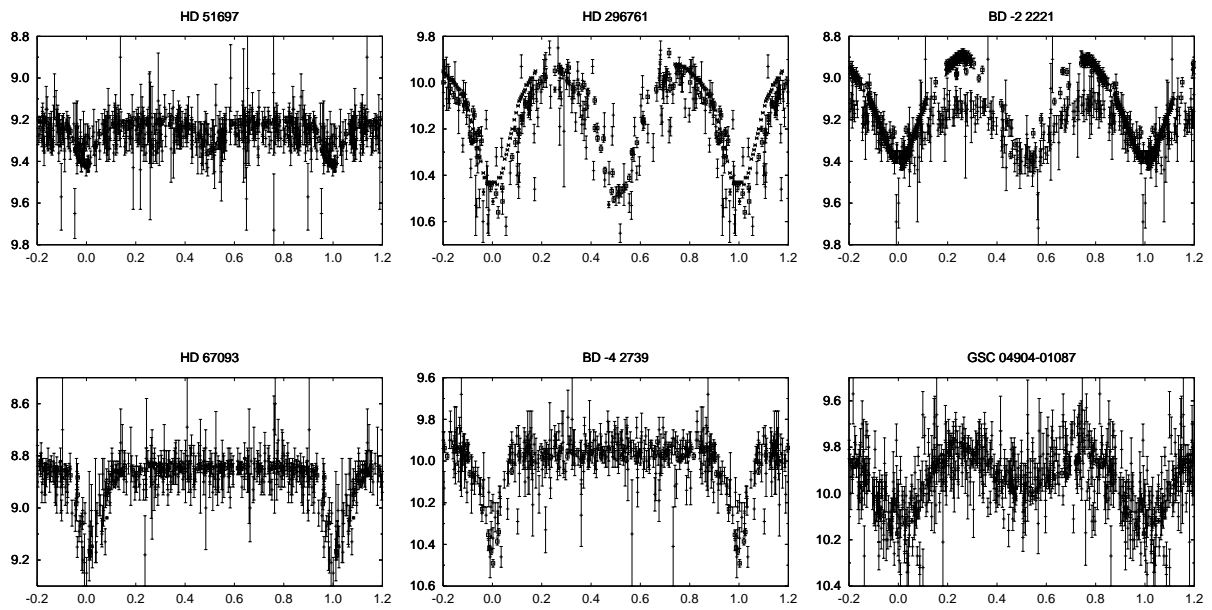


Figure 1. Phased light curves of six of the new eclipsing binaries.

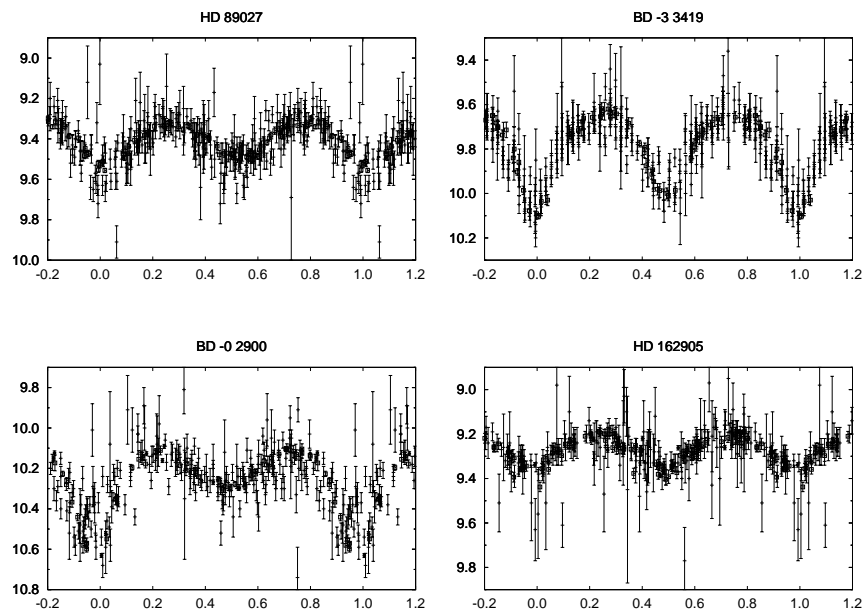


Figure 2. Phased light curves of the remaining four eclipsing binaries.

Table 1. Data on the new eclipsing binaries

Identification	Type	HJD Min -2450000	Period days	Max V	Min I V	Min II V	Remarks
HD 51697	EA	2684.68	2.51640	9.2	9.4	9.35	1
HD 296761	EW	2667.755	0.35843	9.9	10.6	10.5	2,3
BD -2 2221	EW	2681.731	0.63772	8.9	9.4	9.3	2,4
HD 67093	EA	2252.86	2.16780	8.8	9.2	—	5
BD -4 2739	EA	2705.73	0.71958	9.9	10.5	—	5,6
GSC 04904-01087	EB	2722.77	1.05917	9.8	10.2	10.0	
HD 89027	EW	2314.79	0.54011	9.3	9.55	9.5	
BD -3 3419	EW	1661.69	0.31125	9.6	10.1	10.0	7
BD -0 2900	EB	0938.73	0.58040	10.1	10.6	10.5	
HD 162905	EW	2369.95	0.42651	9.2	9.4	9.4	8

1 Visual pair (mag. 9.8 and 10.4) with 3'' separation (not separated on Stardial images)

2 Minimum measured at Rolling Hills Observatory

3 = 1RXS-F J071507.4-044437

4 Eclipse is probably total

5 No secondary minimum detected, period may be double the value given

6 = 1RXS J0950391.1-053029

7 = 1RXS J131032.4-040934

8 According to literature the spectral type is K0, so the given period may be too long

References:

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Richmond, M.W., Droege, T.F., Gombert, G., Gutzwiller, M., Henden, A.A., Albertson, C., Beser, N., Molhant, N., Johnson, H., 2000, *PASP*, **112**, 397

Stellingwerf, R.F., 1978, *ApJ*, **224**, 953

Wils, P., 2003, *IBVS*, No. 5401

ERRATUM FOR IBVS 5425

Geert Hoogeveen reported the following error:

IBVS No.	item	printed	correct
5425	identifer (BD -4°2739)	1RXS J0950391.1-053029	1RXS J095039.1-053029