COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 5916

Konkoly Observatory
Budapest
22 December 2009

HU ISSN 0374 – 0676

NEW CATACLYSMIC VARIABLES FROM 6dFGS SPECTROSCOPY

WILS, PATRICK

Vereniging Voor Sterrenkunde, Belgium; e-mail: patrickwils@yahoo.com

To understand the distribution and evolution of close binaries and cataclysmic variables (CVs) in particular, it is important to have as complete a sample of these stars as possible. Through the Sloan Digital Sky Survey (SDSS) a large number of CVs have been discovered spectroscopically (see e.g. Szkody et al., 2009), revealing quite a different population from the objects discovered before (Gänsicke et al., 2009). As a by-product, the 6dF Galaxy Survey (6dFGS; Jones et al., 2004 and 2009) revealed seven hitherto unknown CVs spectroscopically. In addition the survey contains spectra for another 28 known CVs. Recently a dwarf nova was found by Wils et al. (2009), for which also a 6dFGS spectrum was available, suggesting that not all CVs in that survey have been identified. To look for further CVs, all the 6dFGS spectra originating from Galactic sources (those with Quality = 6) were examined. This turned up another five new CVs, so that a total of 13 previously unknown CVs have been found in the 6dFGS spectra. The five new CVs are listed in Table 1. The ultraviolet magnitudes given in the table have been extracted from GALEX data (Martin et al., 2005).

The spectra for the five systems are given in Figs. 1 and 2, and except for 6dFGS g1915227-263015, all are fairly typical for dwarf novae in quiescence. The object 6dFGS g0242429-114646, which is identical to PHL 1445 (Haro & Luyten, 1962) = PB 9151 (Berger & Fringant, 1984), has double-peaked emission lines, indicating a high inclination system. 6dFGS g1013459-275758 coincides with the X-ray source 1RXS J101345.7-275750. For 6dFGS g1915227-263015 three spectra are available, shown in Fig. 2. Only one of those three is a typical CV spectrum. The He II emission is an indication that it is possibly a magnetic CV, but because it is not particularly strong, it might be an intermediate polar or an SW Sextantis type star. There are four objects within a radius of less than 10 arc seconds around the 6dFGS position, among them is a galaxy. The fibres used to measure the spectra have a diameter of 7 arc seconds. It is suggested that the CV spectrum originated from the object USNO-B1.0 0634-0894139 at the position given in Table 1, and the two other spectra correspond to the brighter K-type star USNO-B1.0 0634-0894149 five arc seconds to the East. Further observations are needed to confirm this.

All objects were examined on images of the United States Naval Observatory, Flagstaff Station and the Near Earth Asteroid Tracking (NEAT) for possible outbursts. A.J. Drake kindly provided observations of 6dFGS g0242429-114646 from the Catalina Real-time Transient Survey (CRTS; Drake et al., 2009) from 2004 to 2009. Data for the other objects were not available from CRTS. Approximate magnitude ranges in Table 1 are

Table 1: New cataclysmic variables identified from 6dFGS spectra.

6dFGS	Position (2000)		fuv	nuv	Mag. range
g0002074-374917	00 02 07.39	−37 49 16.7	18.10	17.94	16.8-17.3
g0242429-114646	02 42 42.86	−11 46 45.5	19.15	18.72	15.7-18.9
g0431396-301514	04 31 39.55	−30 15 14.0	20.76	20.12	17.2-18.6
g1013459-275758	10 13 45.91	−27 57 58.0	20.61	20.35	17.8-18.2
g1915227-263015	19 15 22.18	−26 30 13.9	–	–	16.4-16.9

taken from the CRTS data for 6dFGS g0242429-114646, and from the USNO-B1.0 catalogue values for the other objects. Only 6dFGS g0242429-114646 has been observed in outburst, on only one occasion by CRTS. Some of the data points are anomalously faint, so it may be a deeply eclipsing dwarf nova, in agreement with the broad double-peaked emission lines in the spectrum. The light curve is shown in Fig. 3.

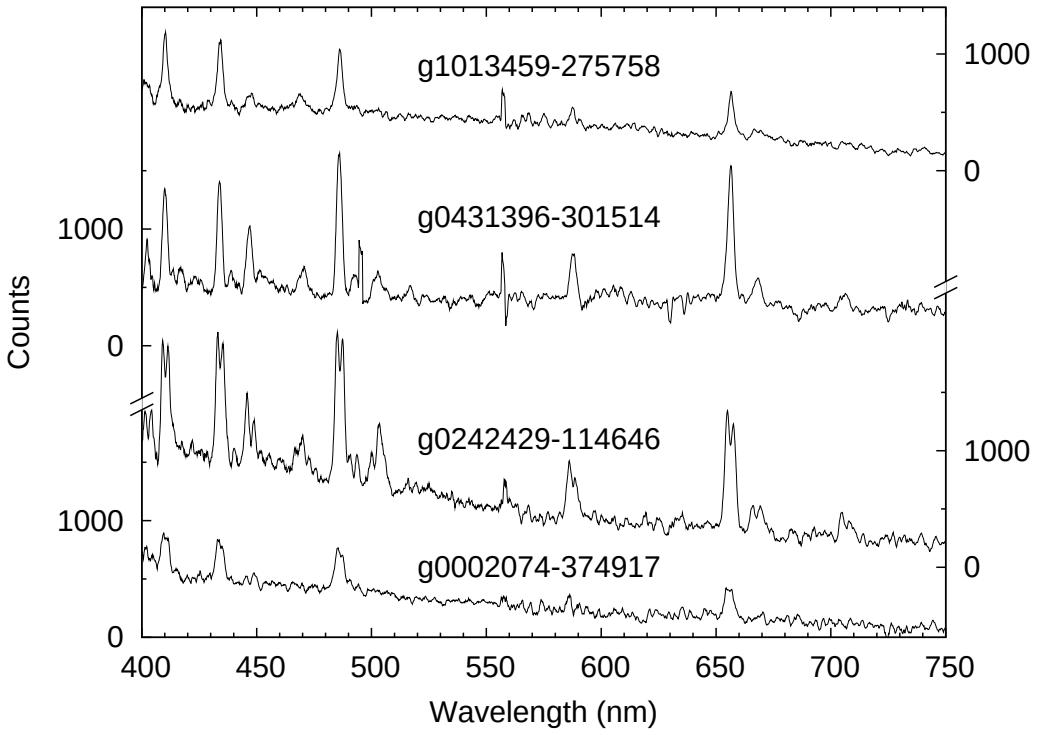

Figure 1. 6dFGS spectra for four cataclysmic variables identified in this paper. For clarity the vertical axis scales are plotted on alternate sides.

Acknowledgements: Boris Gänsicke is gratefully acknowledged for helpful remarks, Heath Jones for commenting on the spectra of 6dFGS g1915227-263015 and Andrew Drake for extracting the CRTS data. Funding for the CRTS survey is provided by the U.S. National Science Foundation under grant AST-0909182.

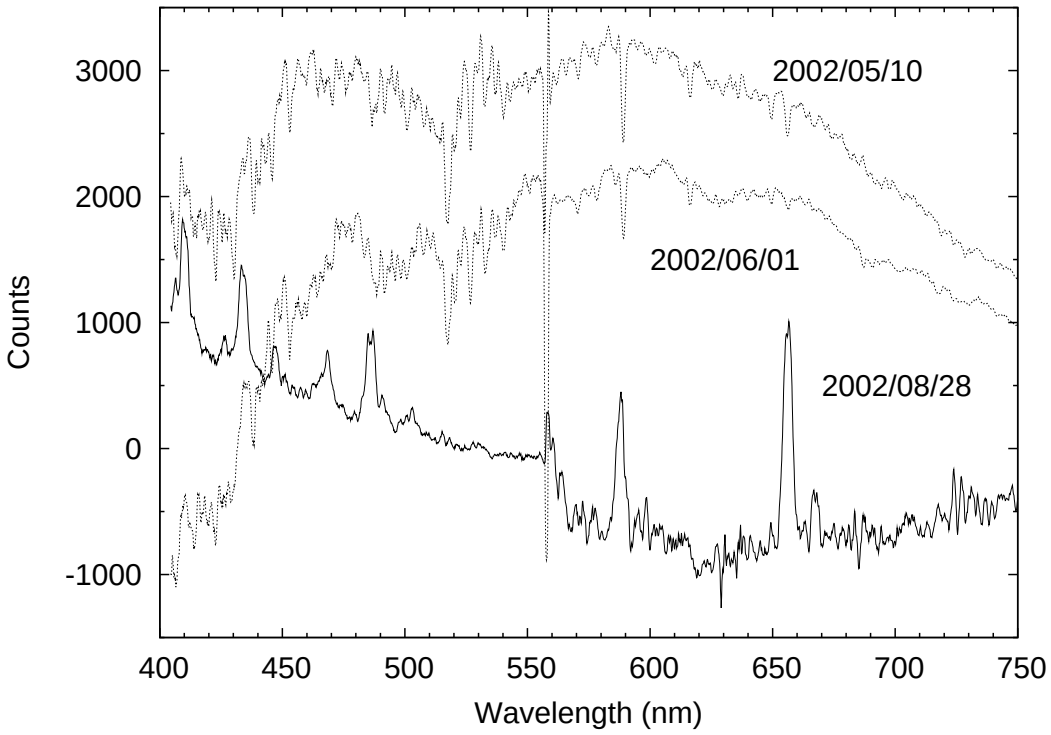

Figure 2. 6dFGS spectra for 6dFGS g1915227-263015 on three different dates in 2002. The line near 560 nm is an artefact of stitching two independent spectra together.

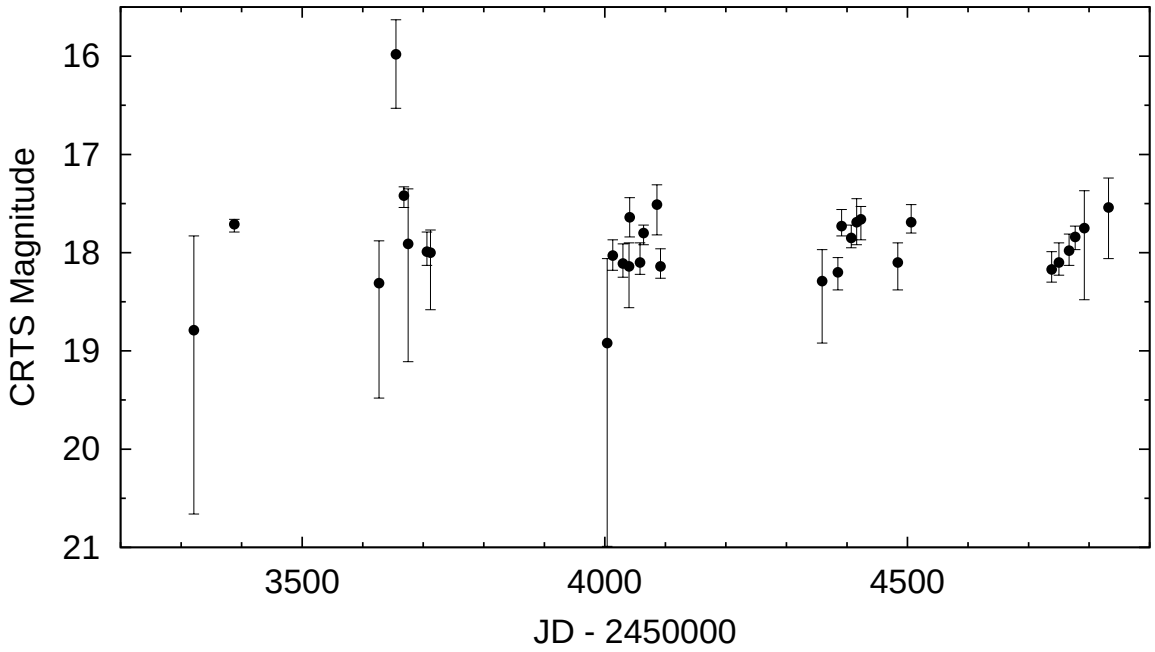

Figure 3. Light curve of PHL 1445 = 6dFGS g0242429-114646 from CRTS data. Each point is the average of four observations from the same night, the error bars indicate the brightest and faintest points.

This study made use of the Simbad and VizieR database (Ochsenbein et al., 2000), the Image and Catalogue Archive operated by the United States Naval Observatory, Flagstaff Station (`http://www.nofs.navy.mil/data/fchpix/`), optical images generated by the Near Earth Asteroid Tracking (NEAT) through the Skymorph website (`http://skyview.gsfc.nasa.gov/skymorph/skymorph.html`) and of data provided by the GALEX mission and the Sloan Digital Sky Survey (SDSS). GALEX (Galaxy Evolution Explorer) is a NASA Small Explorer, launched in April 2003.

References:

Berger, J., Fringant, A.-M., 1984, *A&A Suppl.*, **58**, 565

Drake, A.J., Djorgovski, S.G., Mahabal, A., Beshore, E., Larson, S., Graham, M.J., Williams, R., Christensen, E., Catelan, M., Boattini, A., Gibbs, A., Hill, R., Kowalski, R., 2009, *ApJ*, **696**, 870

Gänsicke, B.T., Dillon, M., Southworth, J., Thorstensen, J.R., Rodrýguez-Gil, P., Aungwerojwit, A., Marsh, T.R., Szkody, P., Barros, S.C.C., Casares, J., de Martino, D., Groot, P.J., Hakala, P., Kolb, U., Littlefair, S.P., Martýnez-Pais, I.G., Nelemans, G., Schreiber, M.R., 2009, *MNRAS*, **397**, 2170

Haro, G., Luyten, W.J., 1962, *Bol. Obs. Tonantz. Tacub.*, **3**, 37

Jones, D.H., Saunders, W., Colless, M. et al., 2004, *MNRAS*, **355**, 747

Jones, D.H., Read, M.A., Saunders, W. et al., 2009, *MNRAS*, **399**, 683

Martin, D.C., Fanson, J., Schiminovich, D., Morrissey, P., Friedman, P.G., Barlow, T.A., Conrow, T., Grange, R., Jelinsky, P.N., Milliard, B., Siegmund, O.H.W., Bianchi, L., Byun, Y.-I., Donas, J., Forster, K., Heckman, T.M., Lee, Y.-W., Madore, B.F., Malina, R.F., Neff, S.G., Rich, R.M., Small, T., Surber, F., Szalay, A.S., Welsh, B., Wyder, T.K., 2005, *ApJ*, **619**, L1

Ochsenbein, F., Bauer, P., Marcout, J., 2000, *A&A Suppl.*, **143**, 23

Szkody, P., Anderson, S.F., Hayden, M., Kronberg, M., McGurk, R., Riecken, T., Schmidt, G.D., West, A.A., Gänsicke, B.T., Nebot, Gomez-Moran A., Schneider, D.P., Schreiber, M.R., Schwope, A.D., 2009, *AJ*, **137**, 4011

Wils, P., Gänsicke, B.T., Drake, A.J., Southworth, J., 2009, arXiv:0910.3218v1 [astro-ph.SR]