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GSC 03129-01490: A NEW δ Sct STAR IN LYRA

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We report on the variability of GSC 03129-01490 (coordinates: $\alpha = 19^{\text{h}}11^{\text{m}}59^{\text{s}}.73$, $\delta = +42^{\circ}18'46''.0$, equinox 2000.0) discovered during a CCD photometric survey of the field of NSV 11814 (also named WR 92, see note below), with the 0.4-m Newtonian telescope at Monegrillo Observatory (Spain), from 14 June 1996 to 16 August 1996. CCD characteristics as well as photometric reduction methods are the same as those mentioned in an earlier paper (Vidal-Sáinz et. al. 2002). Photometric observations were performed using GSC 03129-00938 and GSC 03129-02917 as comparison and check stars, respectively. GSC 03129-01490 (V magnitude of 10.88) is included in the Tycho-1 catalogue (ESA, 1997), and has a $B - V$ colour index of $+0.379 \pm 0.112$. Its measured trigonometric parallax is $65.8 \text{ mas} \pm 30.4 \text{ mas}$.

Our observations show that GSC 03129-01490 is a rapid multiperiodic variable with an observed total V amplitude of about 0.11 mag (Fig. 1). To analyse the periodic nature of the photometric data, *Period98* (Sperl, 1998) was used. The frequency analysis shows two strong frequencies, f_1 and f_2 , at 6.761 ± 0.004 and 13.139 ± 0.004 c/d, respectively (Fig. 2). After prewhitening for these main frequencies in the data, two additional frequencies, f_3 and f_4 , appear at 5.990 ± 0.004 and 10.946 ± 0.004 c/d, respectively. Although the semi-amplitudes of f_3 and f_4 are close to the light-curve's scatter of 0.006 mag, they show a high signal-to-noise ratio indicating that these are very probably genuine frequencies. The frequency analysis is summarized in Table 1.

The lack of precise spectral information for this object together with the large uncertainties on the $B - V$ and parallax values, hinder the determination of the true nature of this variable star: assuming zero reddening, the possible range in $B - V$ values indicates a late A- to a late F-type star (Lang, 1992). In the hypothesis of a F5 main-sequence star with an absolute visual magnitude of +3.5 mag (Lang, 1992) it would appear that the parallax would need to be a few milliarcseconds at most (i.e. at the 2σ limit of the measured parallax), as the apparent V magnitude of 10.88 mag leads to a distance modulus of 3.3. The disagreement is even larger assuming an earlier spectral type. However, the multiperiodic character of the light-curve, the location of the computed frequencies ranging between 5 and 20 c/d and the suggestion that the colour index is a more reliable

indicator of the probable spectral type than the Tycho-2 parallax for this fainter star, strongly suggest that GSC 03129-01490 is a new multiperiodic δ Scuti star.

Table 1. Identified frequencies

Name	Frequency (c/d)	Ampl./2 (mag)	Period (days)	S/N
f_1	6.761	0.020	0.1479	8.4
f_2	13.139	0.016	0.0761	11.3
f_3	5.990	0.010	0.1669	6.3
f_4	10.946	0.007	0.0914	4.9

A few comments are in order regarding the identification of NSV 11814. In the NSV Catalogue (Kholopov, 1982), NSV 11814 is identified with WR 92, and also assigned to GSC 03129-01490 (CDS, Strasbourg). In the original finding chart (Weber, 1959), WR 92 can be identified with GSC 03129-01382. So, NSV 11814 should be identified as GSC 03129-01382 and not as GSC 03129-01490. GSC 03129-01382 was also photometrically monitored but no light variations above noise level were detected.

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References:

- ESA, 1997, *The Hipparcos and Tycho Catalogues*, ESA SP-1200
 Kholopov, P. N., 1982, *New Catalogue of Suspected Variable Stars (NSV)*, Moscow
 Lang, K. R., 1992, *Astrophysical data*, Part I, Springer-Verlag New-York, Inc.
 Sperl, M., 1998, Manual for Period98 (V1.0.4). A period search-program for Windows and Unix, <http://dsn.astro.univie.ac.at/~period98>
 Vidal-Sáinz, J., Gomez-Forellad, J. M., García-Melendo, E., Wils, P., Lampens, P., 2002, *IBVS*, No. 5331
 Weber, R., 1959, *Journal des Observateurs*, **42**, N. 7, 106

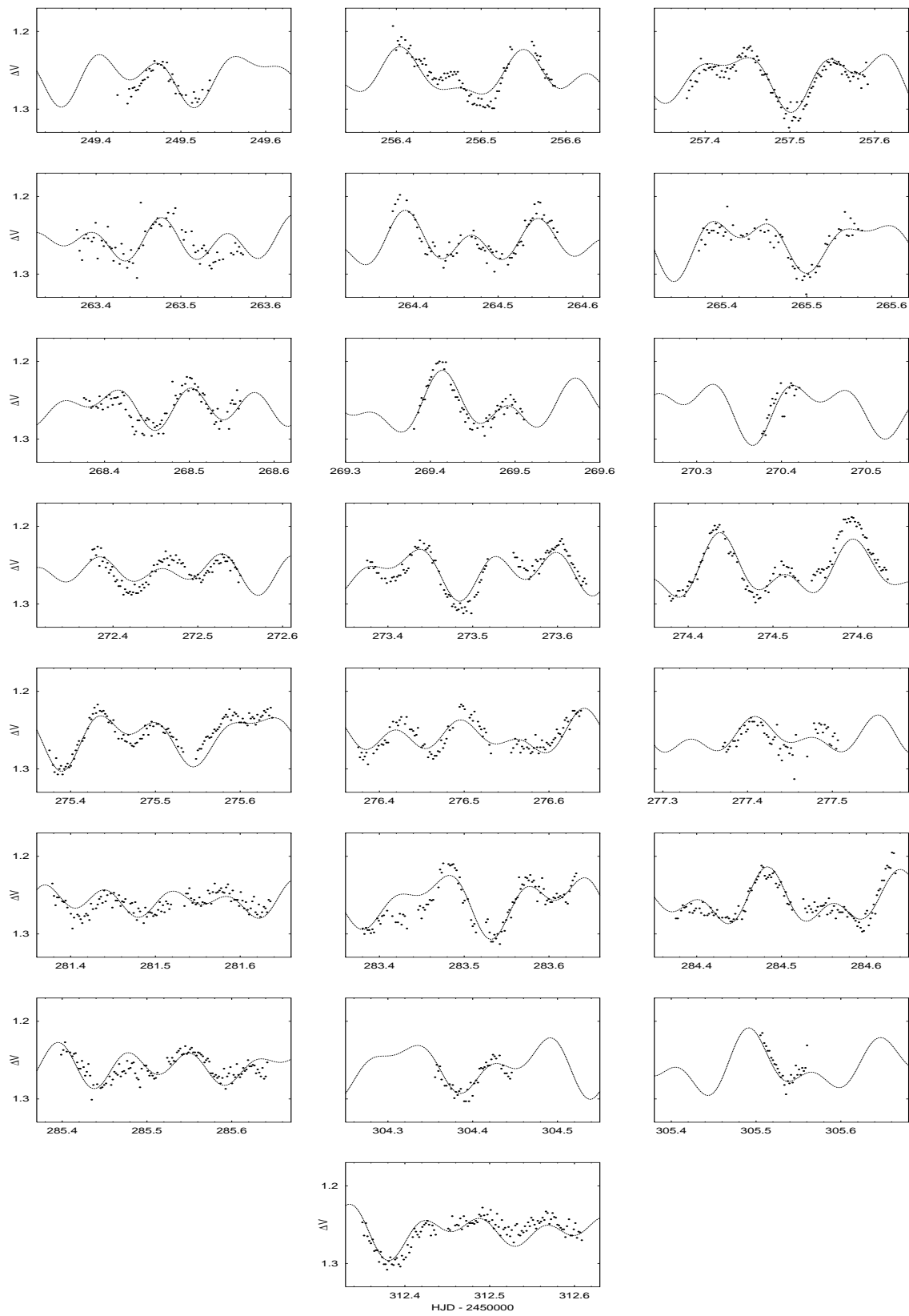


Figure 1. Observed light-curve of GSC 03129-01490 between June and August 1996, fitted with a 4-frequency model.

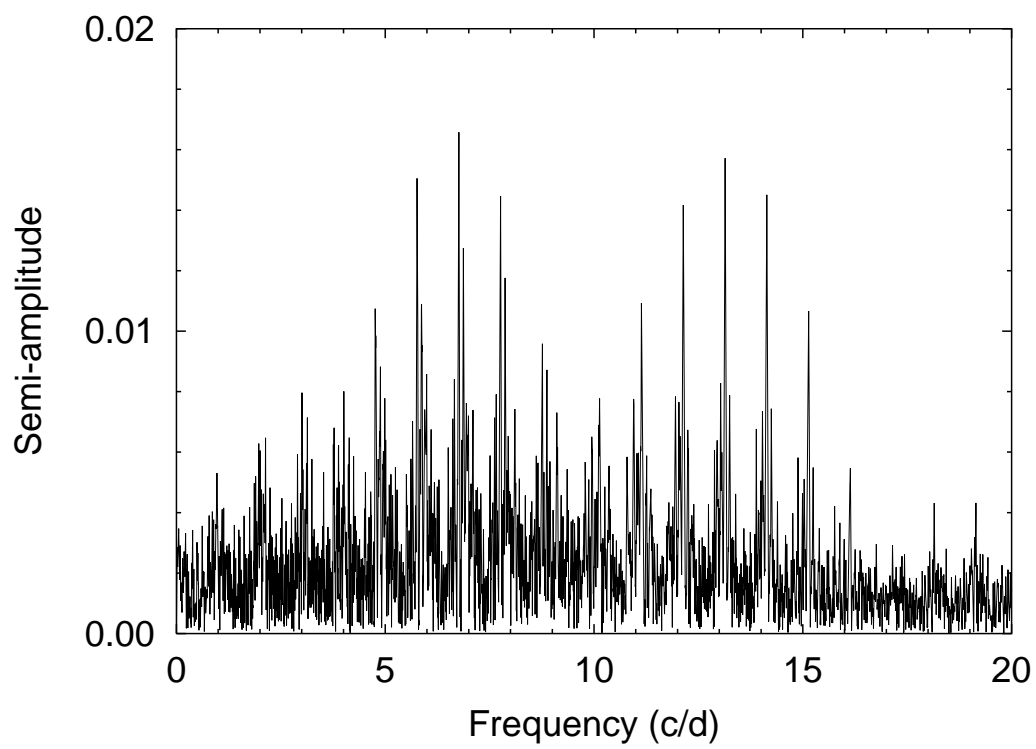


Figure 2. Power spectrum of GSC 03129-01490 photometric data showing the two dominant frequencies at 6.761 and 13.139 c/d.