

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

Number 4815

Konkoly Observatory
Budapest
29 November 1999

HU ISSN 0374 – 0676

NSV 5028: A NEW RR LYRAE TYPE VARIABLE IN UMa

VANDENBROERE, J.; PARIS, B.; VERROT, J.P.

Group Européen d'Observations Stellaires (GEOS), 3 Promenade Venezia, 78000 Versailles, France,
e-mail: j.vandenbroere@skynet.be

NSV 5028 (BV 37 \equiv GSC 3827_104; $10^{\text{h}}58^{\text{m}}08^{\text{s}}$, $+56^{\circ}06'56''$; 2000.0) was discovered to be a variable star by Geyer et al. (1955), who reported rapid variations from $11^{\text{m}}1$ to $11^{\text{m}}7$ (photographic plates). Its spectrum is A4, suggesting a pulsating variable or an eclipsing system.

In 1994 the GEOS could establish an apparent period of $0^{\text{d}}627$, from visual estimates only. Therefore, photoelectric measurements were performed at the Jungfrau-joch Observatory, on the basis of a collaboration between GEOS and Geneva Observatory. Variability was confirmed and 27 *BV* measurements collected during eight nights in three different observing runs allowed us to cover the descending branch of the light curve (Fig. 1). The observed ranges are from 11.07 to 11.57 in *V* filter and from -0.60 to -0.42 in the $(B - V)_G$ colour index. The latter value can be transformed into 0.29–0.44 in the *UBV* system assuming a luminosity class III. Unfortunately, the photometer of the Jungfrau-joch Observatory was removed before we could complete the observation of the whole light curve; however, a pulsating nature was strongly suggested by the observed part of the curve.

New CCD measurements were planned and obtained at the Chateau-Renard Observatory, with the CCD HISIS-22 16 bits camera of the Astroqueyras association attached to the 62-cm Cassegrain telescope. Images taken in white light on two nights in April 1999 allowed us to cover the ascending branch of the light curve (Fig. 2), confirming the RRab nature of NSV 5028. Unfortunately, it was not possible to transform differential magnitudes (with respect to GSC 3827_188) into the standard system. The observed amplitude was 0.44 mag. As expected, this value is smaller than the *V* one since the CCD has its best efficiency toward longer wavelengths, where the amplitude of the pulsation decreases.

From the light curves, it is evident that NSV 5028 is a new RRab star. An ephemeris was calculated on the basis of 50 times of maxima supplied by GEOS visual observers and from the moment of maximum obtained from CCD observations (which was assigned a triple weight):

$$\text{Max} = \text{HJD } 2449065.910 + 0^{\text{d}}627300 \times E \\ \pm 0.012 \pm 0.000014$$

Since the photoelectric and CCD measurements taken on different nights do not show any systematic differences, no appreciable Blazhko effect can be detected. The light

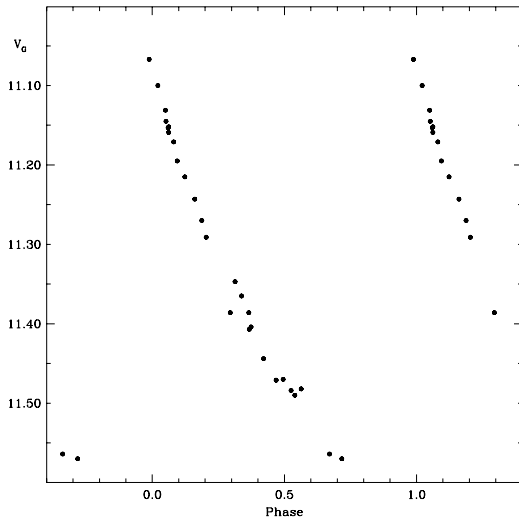


Figure 1. The photoelectric V magnitudes obtained in the Geneva photometric system cover only the descending branch of the light curve.

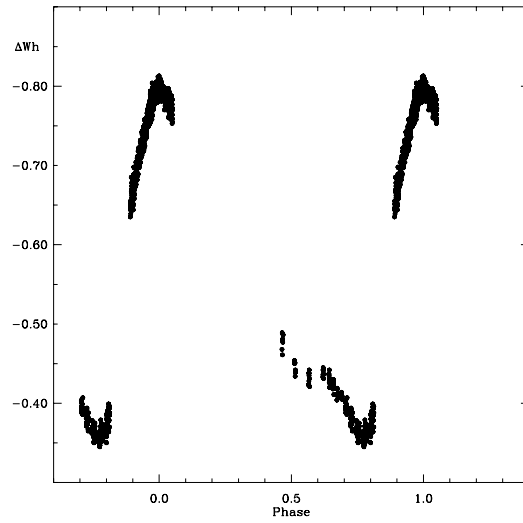


Figure 2. The unfiltered CCD measurements are better distributed along the pulsation cycle of NSV 5028

curve is very asymmetric ($M - m = 0.23$) and the mean magnitude is 11.34 in V light. Assuming $M_V = 0.71$ for RR Lyr stars (Layden et al. 1996), NSV 5028 is at a distance of 1340 pc. Following the relationship proposed by Bono et al. (1997), the relatively small amplitude suggests that NSV 5028 is a metal-rich star. Hence, NSV 5028 is probably a disk population star.

The authors wish to thank R. Boninsegna, J. Remis, P. Van Gheluwe, who helped in the JungfrauJoch missions, and J. Bourgeois, who helped in the CCD observations.

References:

- Bono G., Caputo F., Cassini S., Incerpi R., Marconi M., 1997, *ApJ*, **483**, 811
 Geyer E., Kippenhahn R., Strohmeier W., 1955, *KVB*, 9
 Layden A.C., Hanson R.B., Hawley S.L., Klemola A.R., Hanley C.L., 1996, *AJ*, **112**, 2110