

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

Number 5314

Konkoly Observatory
Budapest
9 September 2002

HU ISSN 0374 – 0676

**DETECTION OF A PULSATING COMPONENT
IN THE ECLIPSING BINARY RX Hya**

KIM, S.-L.¹; KWON, S.-G.¹; YOUN, J.-H.¹; MKRTICHIAN, D.E.²; LEE, J.W.³

¹ Korea Astronomy Observatory, Daejeon, 305-348, Korea (e-mail : slkim@kao.re.kr)

² Astronomical Observatory, Odessa National University, Odessa, Ukraine

³ Dept. of Astronomy and Space Science, Chungbuk National University, Cheongju, 361-763, Korea

Observatory and telescope:	
Sobaeksan Optical Astronomy Observatory, 61cm telescope	
Detector:	SITe 2K CCD camera
Filter(s):	<i>B</i>
Transformed to a standard system:	No
Availability of the data:	
Upon request	
Method of data reduction:	
Standard CCD-frame reduction using the IRAF ¹ package.	

Table 1. Photometric parameters of observed stars

ID	Name	RA (J2000)	DEC (J2000)	V	(B–V)	Sp. Type
VAR	RX Hya	09 ^h 05 ^m 41 ^s .16	–08° 15′39″.7	8 ^m .9~11 ^m .6 [†]	0 ^m .20	A8 [†]
C1	BD–07° 2718	09 ^h 06 ^m 16 ^s .58	–08° 06′44″.5	9 ^m .70	1 ^m .40	–
C2		09 ^h 05 ^m 40 ^s .89	–08° 15′23″.0	11 ^m .5 [‡]	–	F3 [‡]

[†] : from the GCVS (Kholopov et al. 1988)

[‡] : Vyas & Abhyankar (1989)

¹IRAF is distributed by the National Optical Astronomy Observatories, which are operated by the Association of Universities for Research in Astronomy, Inc., under cooperative agreement with the National Science Foundation.

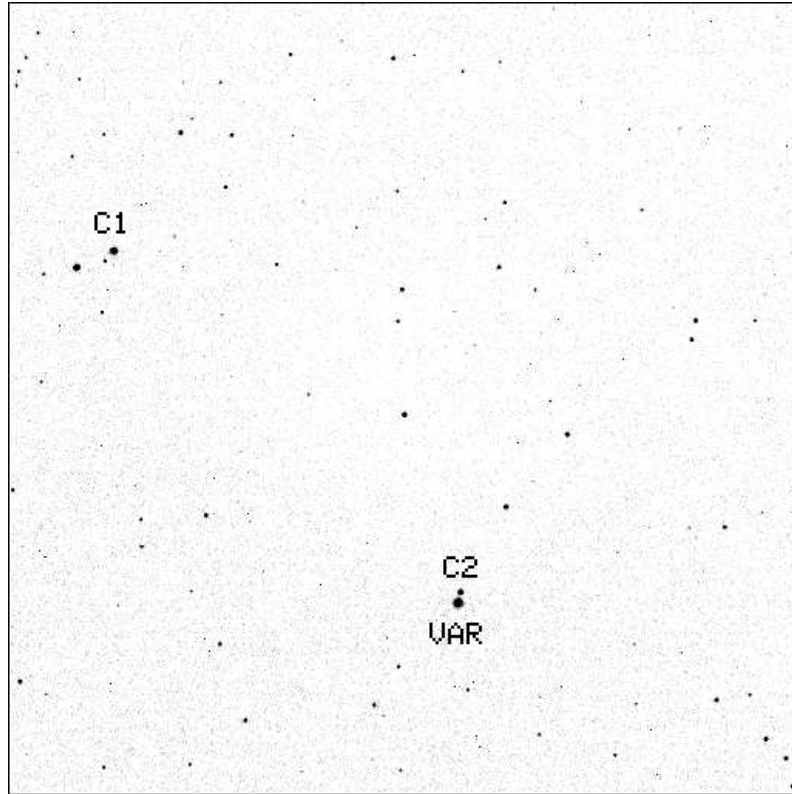


Figure 1. An observed CCD image (20.5×20.5) near the eclipsing binary RX Hya (VAR). The comparison star (C1, BD $-07^{\circ}2718$) and the check star (C2) are marked. North is up and east is to the left

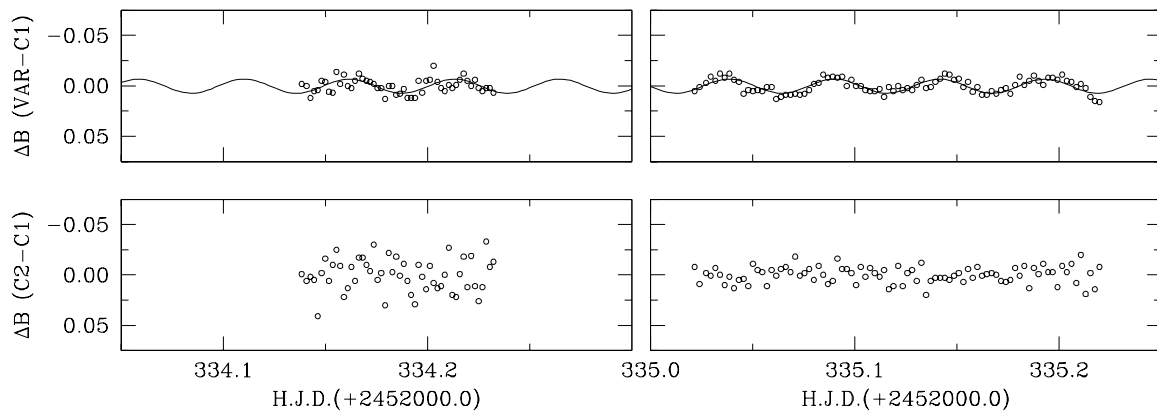


Figure 2. Differential magnitudes of the variable and check stars, after correction for the second-order atmospheric extinction. Sinusoidal curves with semi-amplitude of 7.0 mmag and frequency of 19.39 cycles/day, obtained in this study, are superimposed in the upper panels

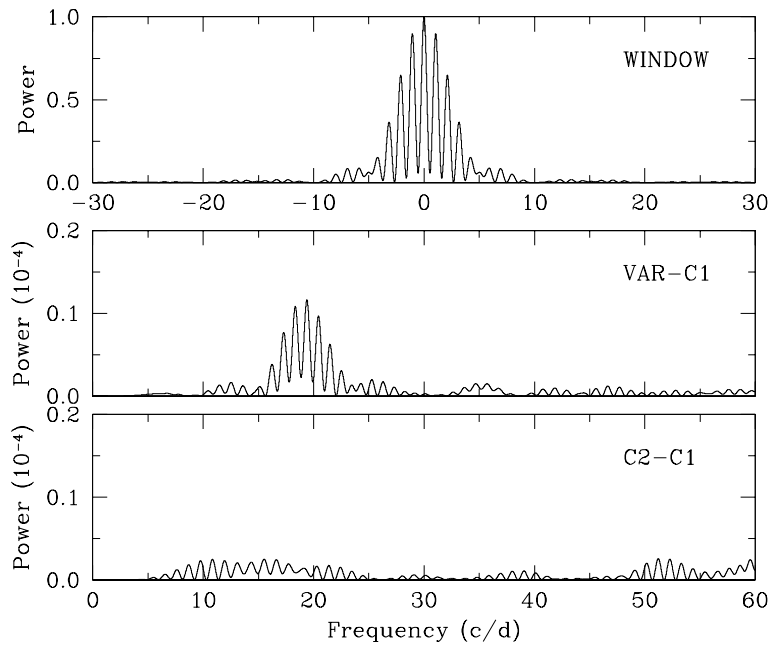


Figure 3. Power spectra of the variable and check stars. Window spectrum is in the top panel. The dominant pulsation frequency of the variable star RX Hya is shown at 19.39 cycles/day in the middle panel. The spectrum of the check star plotted in the bottom panel shows only noise-level powers

Remarks:

As a part of the observational survey to search for A-F spectral type pulsating components in eclipsing binary systems, in collaboration with the Central Asian Network group (Mkrtychian et al. 2002a), we performed time-series CCD observations of the eclipsing binary RX Hya in February 28 and March 1, 2002, with *B* filter. Among several stars near the variable star, the brightest star BD-07°2718 was chosen as comparison star. We applied simple aperture photometry to get instrumental magnitudes with an aperture radius of 6''0; typical atmospheric seeing was about 2''7 during the observing runs.

We observed the variable star during out-of eclipsing orbital phases around 0.77 (H.J.D. 2452334.2) and 0.18 (H.J.D. 2452335.1), calculated from the GCVS data (Kholopov et al. 1988). Differential magnitudes were calculated according the standard differential photometric method. We corrected for the second-order atmospheric extinction effect, the slow airmass-related light variation, because the color index of the comparison star was quite different from that of the variable star and the data were obtained at large airmasses ranging from 1.4 to 2.5.

We have clearly detected oscillation features of the variable star RX Hya (Figure 2). In order to derive its period, we performed Fourier analysis (Kim & Lee 1996). Figure 3 displays power spectra of the variable and check stars. We obtained a dominant frequency of 19.39 cycles/day and a semi-amplitude about 7 mmag in B-band for the variable star.

Remarks:

Mkrtychian et al. (2002b) suggested a new pulsating group defined as “the (B)A-F spectral type mass-accreting main-sequence pulsating stars in semi-detached Algol-type binary systems”. Their pulsation characteristics are very similar to those of δ Scuti type stars, but this evolution is different due to mass-accretion. Considering spectral type, sinusoidal light curves, frequency and amplitude of pulsation, and the membership in a semi-detached Algol type system, we suggest that the primary component of RX Hya is a new, seventh member of this pulsating group.

Acknowledgements:

This research made use of the SIMBAD database, operated at CDS, Strasbourg, France

Reference:

- Kholopov, P.N., Samus, N.N., Frolov, M.S., et al., 1988, in *General Catalogue of Variable Stars*, 4th Edition (Moscow: Nauka Publishing House)
- Kim, S.-L., Lee, S.-W., 1996, *A&A*, **310**, 831
- Mkrtychian, D.E., Kusakin, A.V., Gamarova, A.Yu., et al., 2002a, in *Observational aspects of pulsating B & A stars*, ed. C. Sterken, & D.W. Kurtz, *ASP Conf. Ser.*, **256**, 259
- Mkrtychian, D.E., Kusakin, A.V., Gamarova, A.Yu., Nazarenko, V., 2002b, in *Radial and nonradial pulsations as probes of stellar physics*, ed. C. Aerts, T.R. Bedding, & J. Christensen-Dalsgaard, *ASP Conf. Ser.*, **259**, 96
- Vyas, M.L., Abhyankar, K.D., 1989, *A&AS*, **81**, 67