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

Number 6178

Konkoly Observatory
Budapest
25 July 2016

HU ISSN 0374 – 0676

DISCOVERY OF A NEW PULSATING MASS-ACCRETING COMPONENT IN THE ALGOL-TYPE SYSTEM VY Hya

GUNSRIWIWAT, K.[1]; MKRTICHIAN, D.E.[2]

[1] Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Muang, 50200 Chiang Mai, Thailand

[2] National Astronomical Research Institute of Thailand, 191 Siriphanich Bldg., Huay Kaew Rd., Suthep, Muang, 50200 Chiang Mai, Thailand

So called oEA stars (**o**scillating **E**clipsing **A**lgol stars), according to classification (Mkrtichian et al. 2002, 2004), consist of A-F spectral type oscillating mass-accreting components of the semi-detached Algol type eclipsing binary systems. These stars are former low-mass secondaries of evolved close binary systems which passed through the first mass-transfer exchange and finally settled on the main sequence. These mass-accreting components lie inside the classical instability strip of δ Scuti and related stars. Since 2002, when the oEA group was classified, dozens of oEA stars have been discovered.

VY Hya is a semi-detached (Algol-type) close binary system with an A3 V primary component and 2.0011799-day orbital period (Brancewicz & Dworak, 1980). The spectral class of the primary and the semi-detached configuration of binary system pin up it into the instability strip of δ Scuti-type and related stars. We include it to the target list of the "Thai Sky Survey for oEA Stars" (THASSOS) in order to search for pulsations.

The photometric observations of VY Hya were obtained during 4 nights (15-18 March 2014) with an Apogee Alta F42 CCD camera attached to the 0.6-meter Thai Southern Hemisphere Telescope (TST) PROMPT8 at Cerro Tololo Inter-American Observatory (CTIO). 20 second exposures through B filter were used.

All stars in the field of view were reduced by Maxim DL5 program using aperture photometry. Comparison and check stars for VY Hya are listed in Table 1. Phased differential light curve folded with the period of 2.0011799 days is plotted in Figure 1. As seen, all observations were obtained during out-of-eclipse orbital phases optimal for searching for pulsations. To extract pulsational variations, slow orbital light variations for every night were removed using low-order polynomial fits and residuals were merged.

Table 1: Data on VY Hya, comparison and check stars.

Star	RA (J2000)	DEC (J2000)	B
VY Hya	$0^{\rm h}20^{\rm m}16\overset{\rm s}{.}0$	$-23°09'05\overset{''}{.}2$	10.61
HD89638 (Comparison Star)	$10^{\rm h}20^{\rm m}13\overset{\rm s}{.}2$	$-23°06'09\overset{''}{.}3$	8.43
HD89581 (Check Star)	$10^{\rm h}19^{\rm m}48\overset{\rm s}{.}8$	$-22°58'16\overset{''}{.}6$	8.96

The residuals from the orbital light curve of VY Hya shown in Figure 2 exhibits strong amplitude modulation indicating multiperiodicity of pulsations.

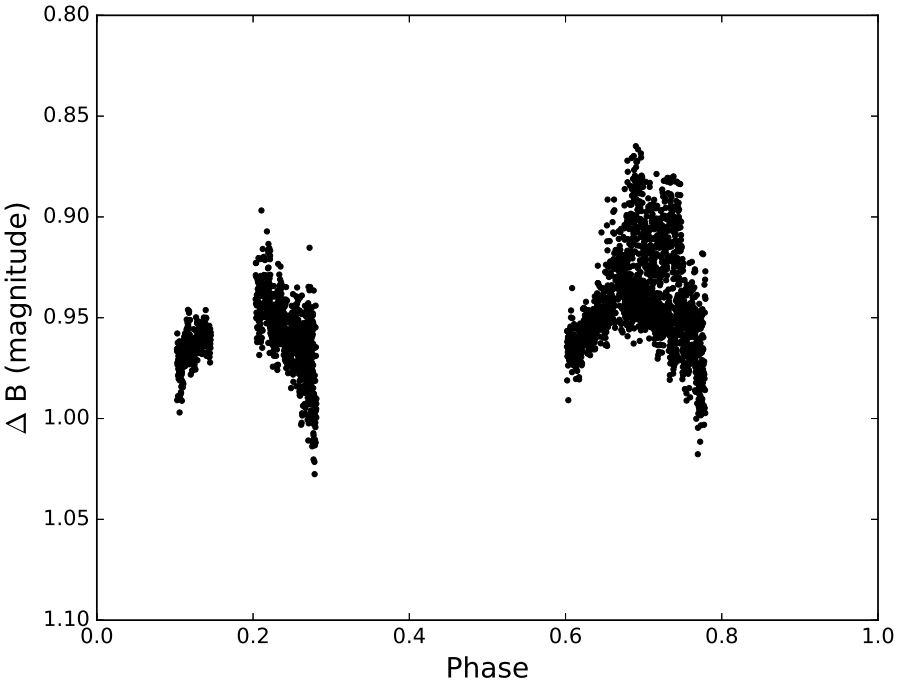

Figure 1. The phased B-filter light curve of VY Hya folded on the period of 2.0011799 days.

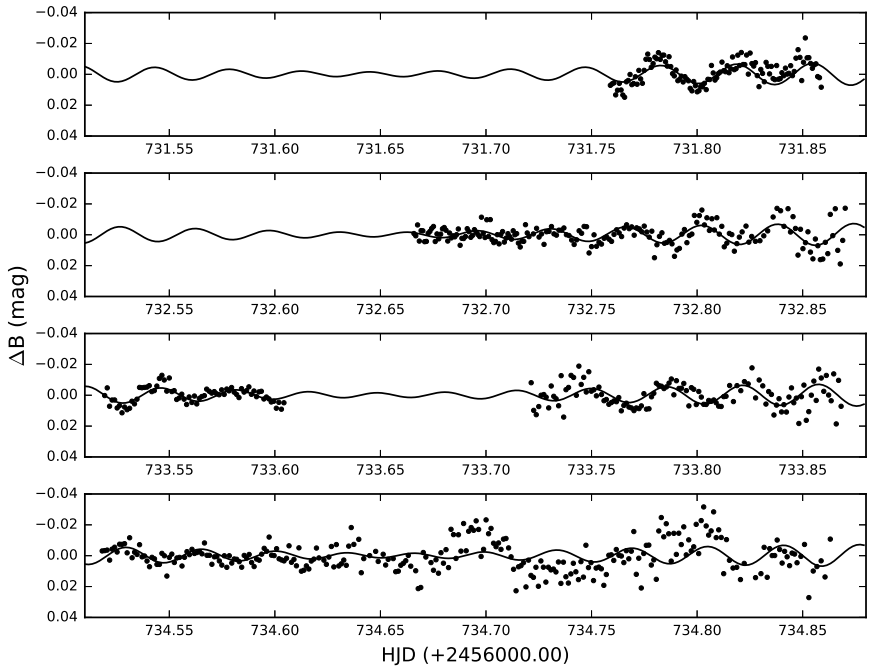

Figure 2. The nightly residual light variations (time zero point is HJD 2456000+).

Discrete Fourier Transform (DFT) analysis was applied to the all residual data to find the pulsation frequencies of the primary component. The signal pre-whitening technique was used for consecutive detection of signals in the data. The steps of DFT analyses and consecutive prewhitening of VY Hya are shown in Figure 3 from top to bottom. Two oscillation frequencies, listed in Table 2, were detected.

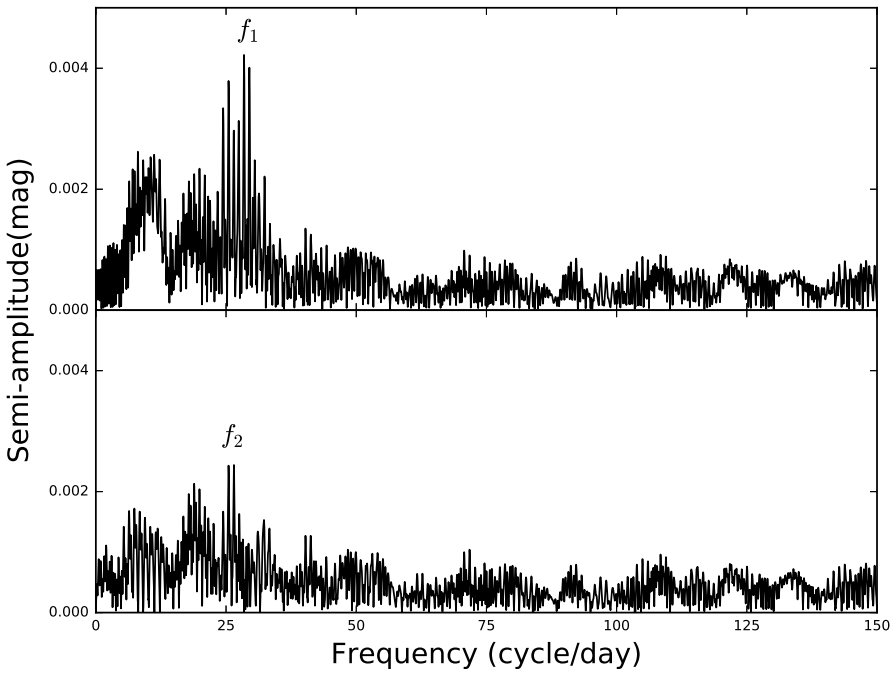

Figure 3. The DFT amplitude spectrum of the residual light curve of the primary component (top) and after the pre-whitening procedure (bottom).

Table 2: Pulsation frequencies and amplitudes.

Frequency (c/d)	Amplitude (mag)
F_1=28.44±0.01	0.0043±0.0004
F_2=26.50±0.02	0.0024±0.0004

We conclude that the primary component of VY Hya is a new member of the oEA group of pulsating mass-accreting components of Algols.

Acknowledgements: Department of Physics and Materials Science Chiang Mai University thanked for support. This work is a part of research activity of the National Astronomical Research Institute of Thailand (NARIT).

References:

Brancewicz, H. K., Dworak, T. Z., 1980, *AcA*, **30**, 501
Mkrtichian D. et al., 2002, *ASP Conf. Ser.*, **259**, 96
Mkrtichian, D.E., Kusakin, A.V., Rodriguez, E., et al., 2004, *A&A*, **419**, 1015