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DETECTION OF MULTIPERIODIC OSCILLATIONS IN THE MASS-ACCRETING COMPONENT OF GQ TrA

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The "**Tha**i **S**ky **S**urvey for **o**EA **S**tars" (THASSOS) project is focused on searching for and studies of new mass-accreting pulsating components of a semi-detached Algol-type systems, the class called oEA stars (Mkrtichian et al., 2002, 2004). From the point of view of stellar evolution, this class of pulsating stars is different from pulsating δ Scuti type stars in the detached eclipsing binary systems, showing similar pulsational characteristics.

GQ TrA is a southern semi-detached Algol type eclipsing binary system with A3V primary component and 2.339450-day orbital period. It was discovered and classified as an Algol type star by Hoffmeister (1949).

The new CCD photometric observations for GQ TrA were obtained during 7 nights from 16 to 22 April 2014 using the Thai Southern Hemisphere Telescope (TST, PROMPT-8) at Cerro Tololo Inter-American Observatory (CTIO) in Chile. Ten second exposures through B-filter were used. All stars in the field of view were reduced by MaxIm DL 5 software using aperture photometry, TYC 9049-1892-1 star (RA = $16^{\rm h}22^{\rm m}07\overset{\rm s}{.}19$ DEC= $-65°46'34\overset{''}{.}7$) was used as a comparison star. Phased differential light curve folded according to HJD = 2452501.01 + 2.339450 × E is shown in Figure 1. Times of GQ TrA light minima were measured using quadratic polynomial fitting method. The Heliocentric Julian Day (HJD) of a primary minimum measured on 18 April 2014 is 2456765.7942.

The pulsations variations were searched for in the out-of-eclipse parts of light curves after removal of slow orbital variations using the low order polynomial fits. Residual light curves are shown in Figure 2. The periodic variations in the residual data were analysed using the Period04 software (Lenz & Breger, 2005). We use a Discrete Fourier Transform (DFT) and pre-whitening technique for consecutive detection of signals in the data. The steps of DFT analyses and consecutive pre-whitenings of found frequencies are shown in Figure 3 from top to bottom. We detected eight oscillation frequencies in the interval of 39.0 - 47.9 c/d (30-36.9 min). Frequencies are listed in Table 1.

Conclusion: We found a new time of primary minima. We conclude that GQ TrA is a new member of oEA group of pulsators, showing a rich spectrum of relatively high amplitude, low-degree oscillations. It is a promising target for further photometric and especially spectroscopic line profile detection of the full (low- and high-degree) spectrum of non-radial oscillations.

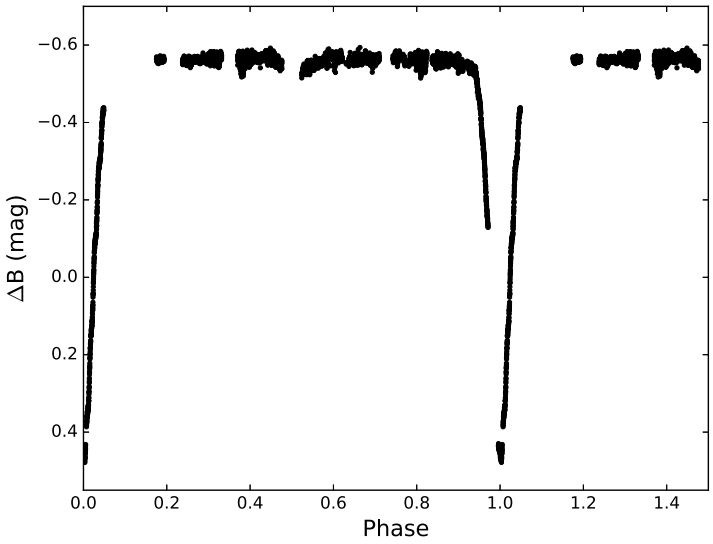

Figure 1. The phased B-filter light curve of GQ TrA folded with the period of 2.339450 days.

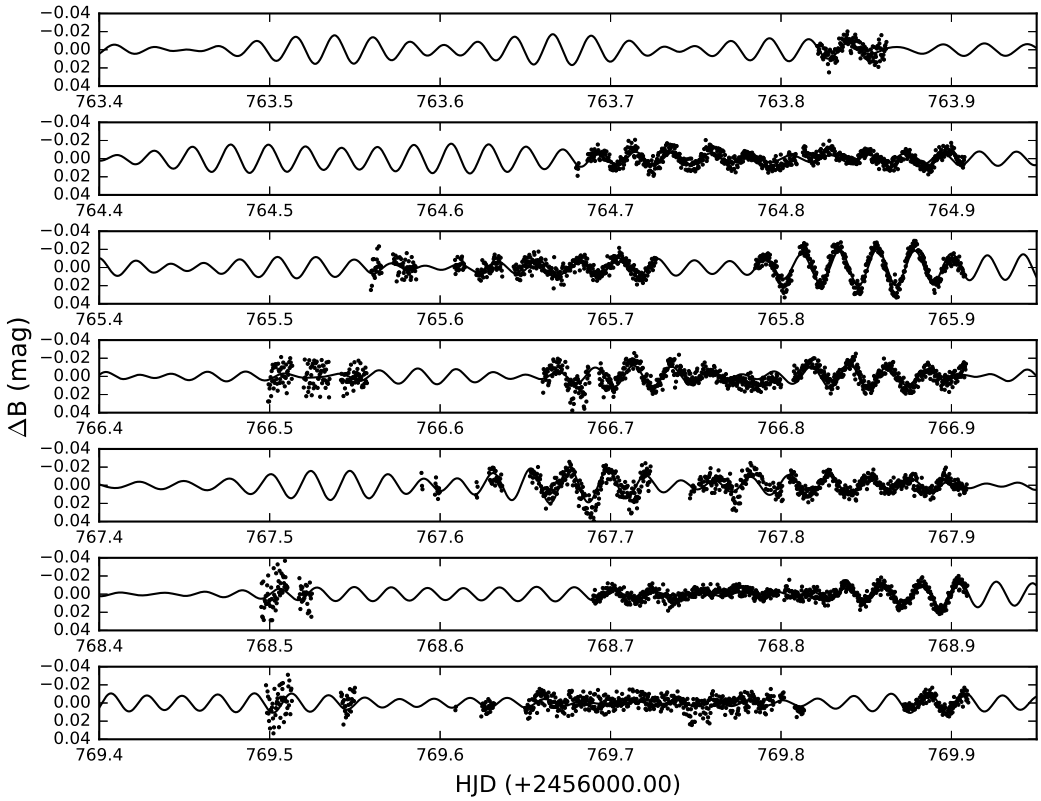

Figure 2. The nightly residual light variations (HJD time zero point is 2456000+).

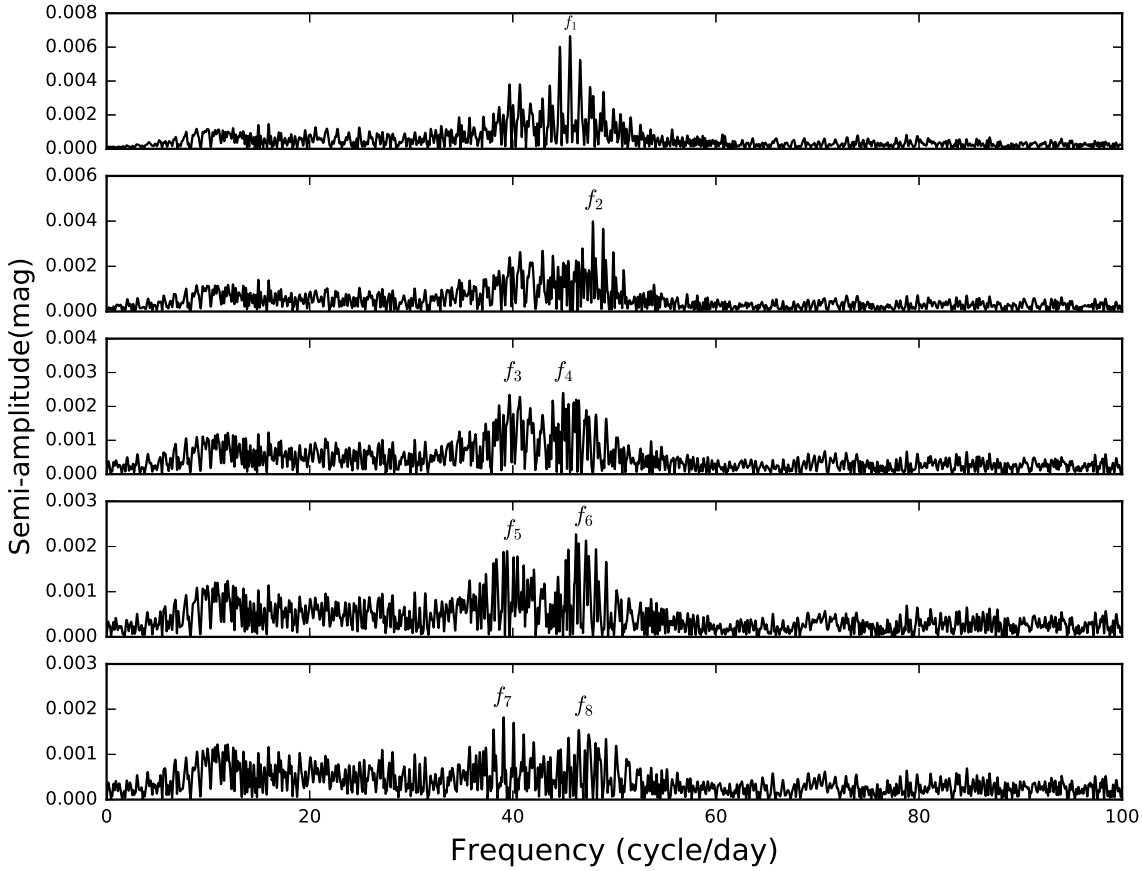

Figure 3. The DFT amplitude spectra of the primary component after consecutive (from top to bottom) pre-whitening procedures.

Table 1: Pulsation frequencies and amplitudes.

Frequency (c/d)/(σ)	Amplitude (mag)/(σ)
f_1=45.644(2)	0.0060(1)
f_2=47.900(3)	0.0044(1)
f_3=44.954(4)	0.0028(1)
f_4=39.669(4)	0.0033(1)
f_5=46.201(6)	0.0020(1)
f_6=39.409(5)	0.0023(1)
f_7=39.094(6)	0.0020(1)
f_8=46.542(5)	0.0024(1)

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