

# Searching for new DA white dwarf pulsators at Konkoly Observatory

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## 1. Introduction:

We present our results on our survey searching for new ZZ Ceti stars, inspired by the recently launched *TESS* space mission. The 20 targets were bright DA-type white dwarfs located close to the empirical ZZ Ceti instability strip. We successfully identified three new pulsators, namely EGGR 120, PM J22299+3024 and WD 1310+583, and derived detection limits for possible pulsations for the rest of the objects.

We performed the observations with the 1-m Ritchey–Chrétien–Coudé telescope located at the Piskéstető mountain station of Konkoly Observatory, Hungary, in white light.

We selected our targets utilizing the Monteral White Dwarf Database (Dufour et al. 2017). We chose our targets by effective temperature, surface gravity, and brightness: we looked for new pulsators amongst white dwarfs brighter than 16.5 magnitude.

## 2. Stars showing no light variations:

17 out of the 20 stars in our sample were not observed to vary (NOV stars). We did not find any significant frequencies in their Fourier transform (FT) which would suggest that pulsation operates in them.

The significance levels for the different light curves were calculated by computing moving averages of the FTs of the measurements, which provided us an average amplitude level ( $\langle A \rangle$ ). We considered a peak significant if it reached or exceeded the  $4\langle A \rangle$  level. Table 1 summarizes these  $4\langle A \rangle$  significance levels in parentheses and in mmag units, found to be around 1–2 mmag in most cases. Figure 1 shows the classical ZZ Ceti instability strip with the known DAV stars, including the objects listed in Table 1 and the newly identified ZZ Cetis presented here.

ID	Classification	ID	Classification
EGGR 116	NOV(1)	PM J18073+0357	NOV(2.5)
EGGR 155	NOV(2)	TON 451	NOV(6)
EGGR 162	NOV(1)	WD 0129+458	NOV(1)
EGGR 311	NOV(2)	WD 0145+234	NOV(2)
GD 340	NOV(2)	WD 0449+252	NOV(2)
GD 426	NOV(2)	WD 0454+620	NOV(1)
GD 429	NOV(2.5)	WD 1152+795	NOV(3)
GD 83	NOV(2)	EGGR 120	ZZ Ceti
HG 8-7	NOV(2)	PM J22299+3024	ZZ Ceti
PG 1026+024	NOV(3)	WD 1310+583	ZZ Ceti

Table 1: list of the observed targets and detection limits for the NOV stars.

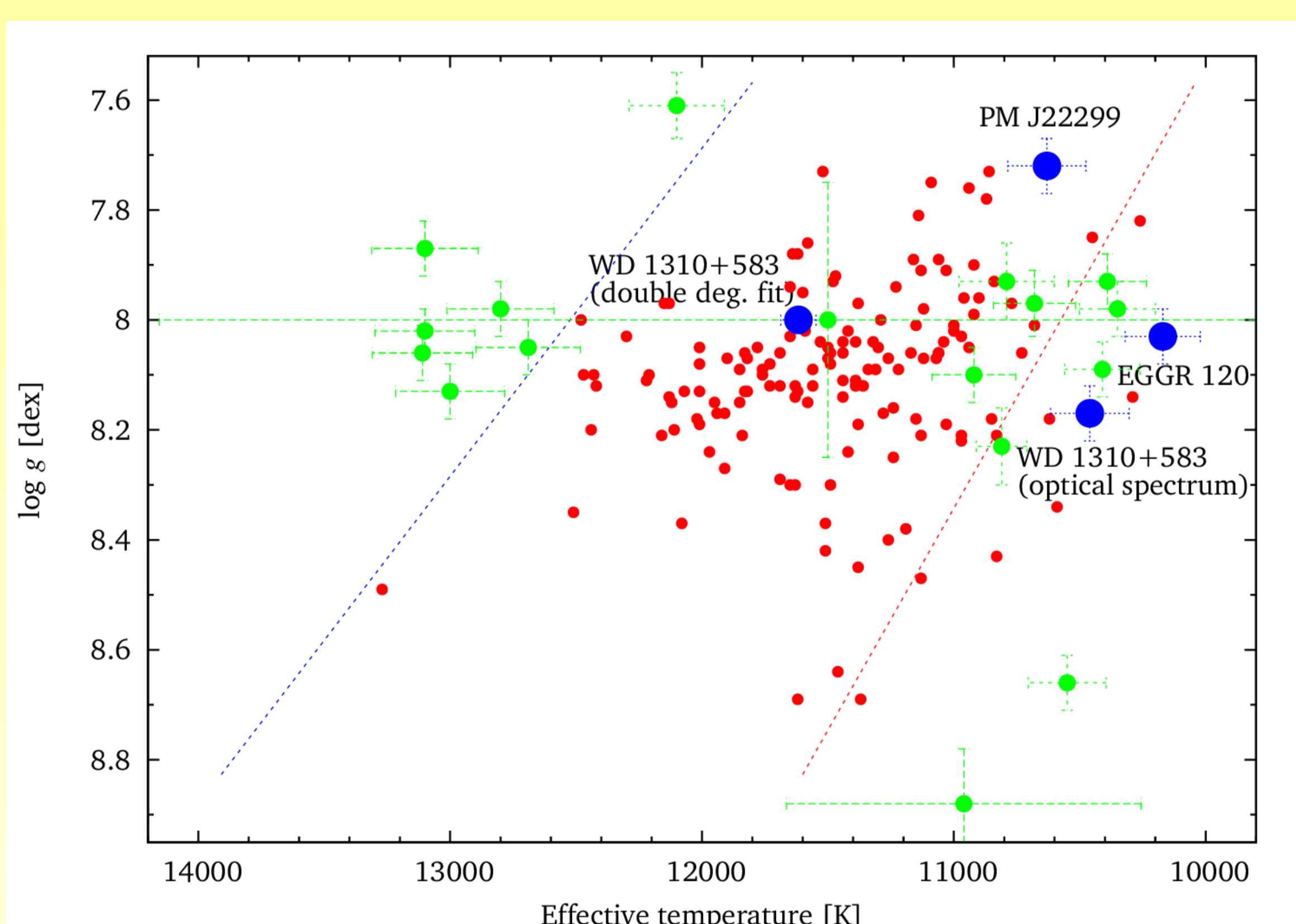


Figure 1: Known variable stars (red filled dots) and the newly observed ZZ Ceti candidates and DAVs (green and blue dots, respectively) in the  $T_{\text{eff}} - \log g$  diagram. The atmospheric parameters of the known DAV stars are from the database of Bognár & Sódor (2016). Blue and red dashed lines denote the hot and cool boundaries of the instability strip, according to Tremblay et al (2015).

## 3. New variables

EGGR 120 ( $V = 14.8$  mag) was found to be a variable by one night of observation. Figure 2 shows its light curve and the corresponding FT. We detected one significant frequency at 1332  $\mu\text{Hz}$  (751 s) with 2.3 mmag amplitude.

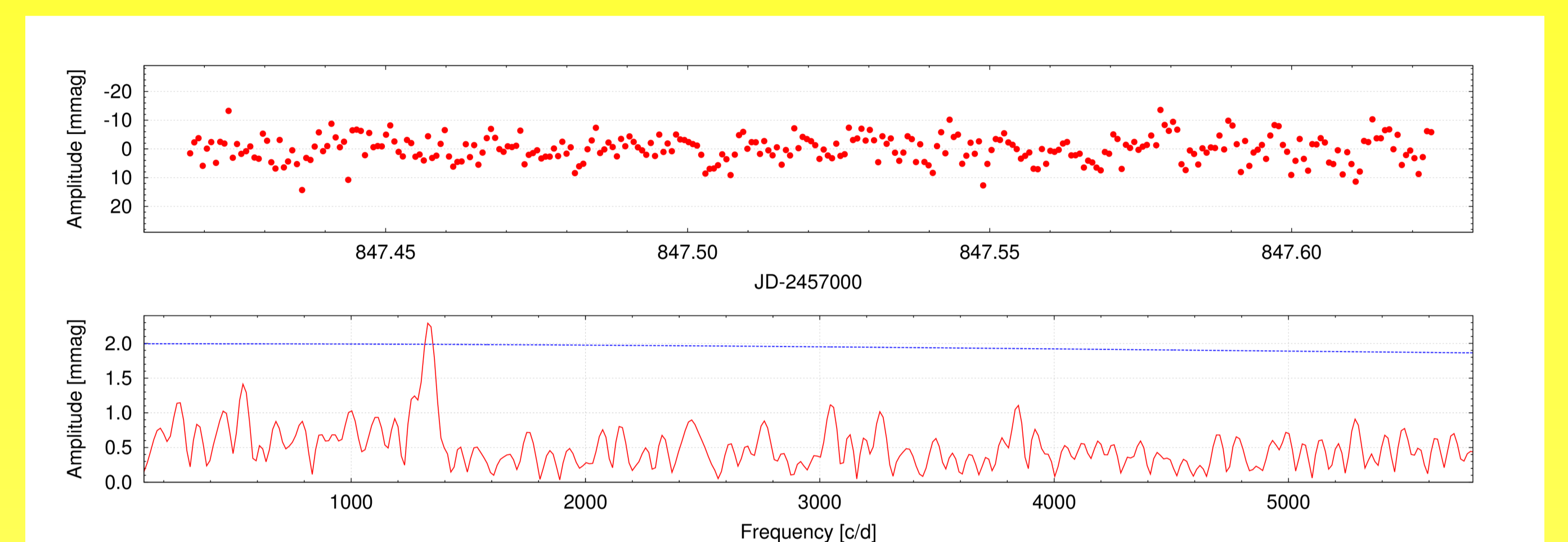


Figure 2: EGGR 120: light curve and its Fourier transform. Blue line denotes the  $4\langle A \rangle$  significance level.

For the newly identified ZZ Ceti star PM J22299+3024 ( $V = 15.9$  mag), we were able to derive three pulsation frequencies by the pre-whitening of its discovery light curve at 935, 1009 and 849  $\mu\text{Hz}$  (1070, 991 and 1178 s) with 15.4, 7.3 and 5.8 mmag amplitudes. Figure 3 shows the light curve and its Fourier transform, respectively.

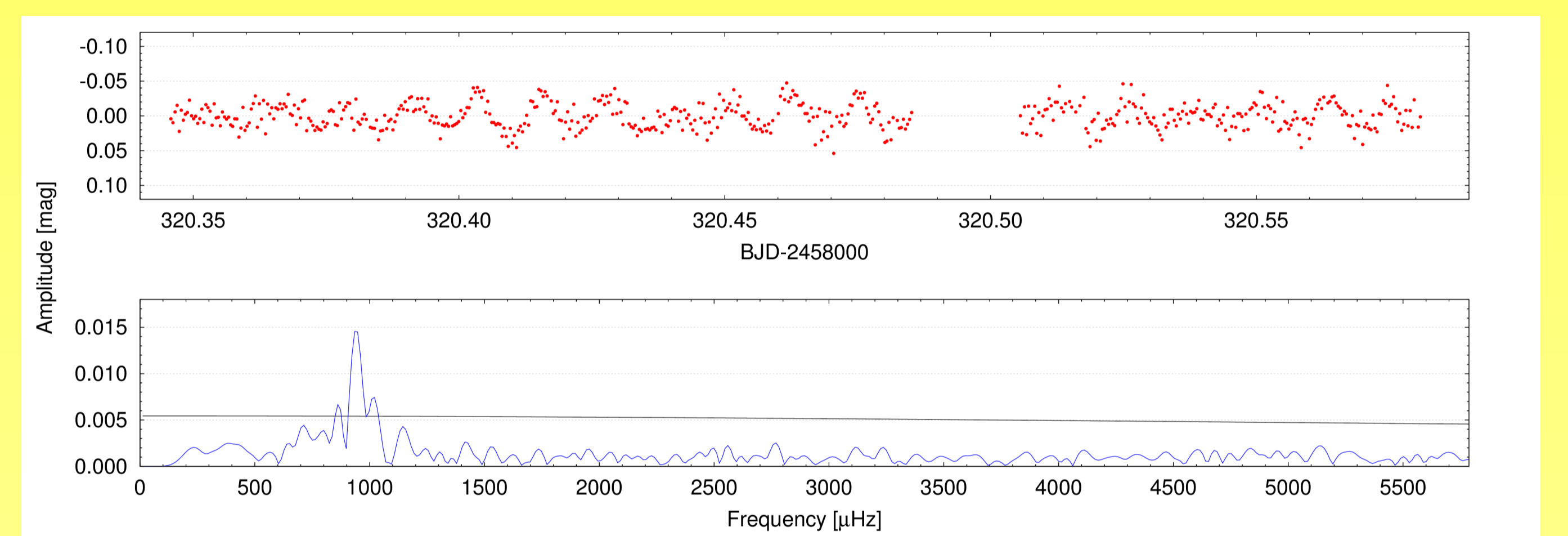


Figure 3: PM J22299+3024: light curve and its Fourier transform. Black line denotes the  $4\langle A \rangle$  significance level.

WD 1310+583 ( $B = 13.9$  mag), a presumed double degenerate binary system (Gentile Fusillo et al. 2018), was observed on eight nights during the March–July, 2017 term. Figure 4 shows the light curves of observations. The Fourier analysis of the whole dataset resulted in the determination of 17 frequencies between 632 and 4494  $\mu\text{Hz}$  (1582 and 223 s), including some combination terms.

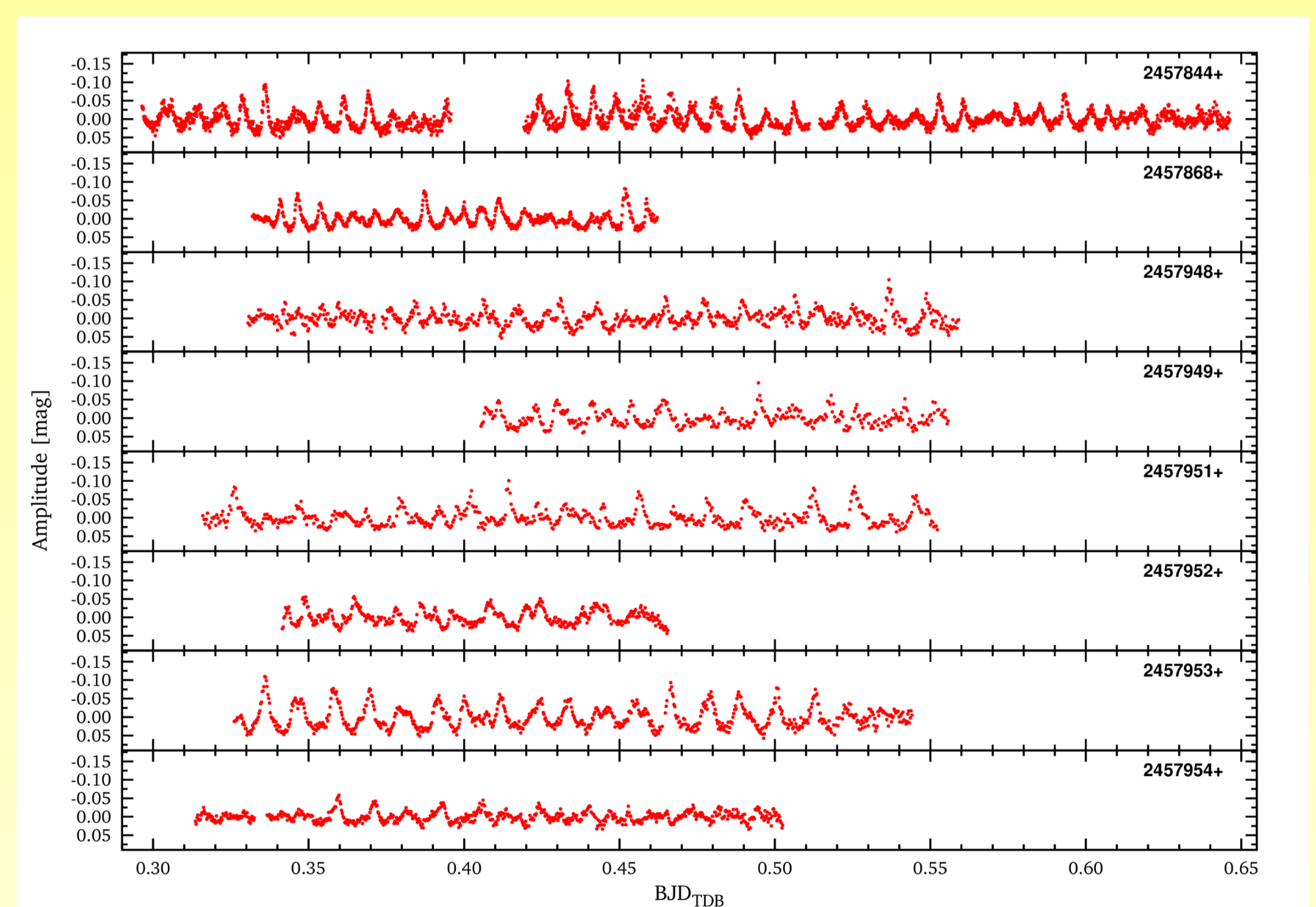


Figure 4: Normalized differential light curves of the observations of WD 1310+583.

Detailed discussions on the NOV stars and on the new variables, with special regards to WD 1310+583, are presented in Bognár et al. (2018) and in Bognár, Kalup & Sódor (2018).

## References:

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