The pulsations of the *Kepler* eccentric binary KIC10080943

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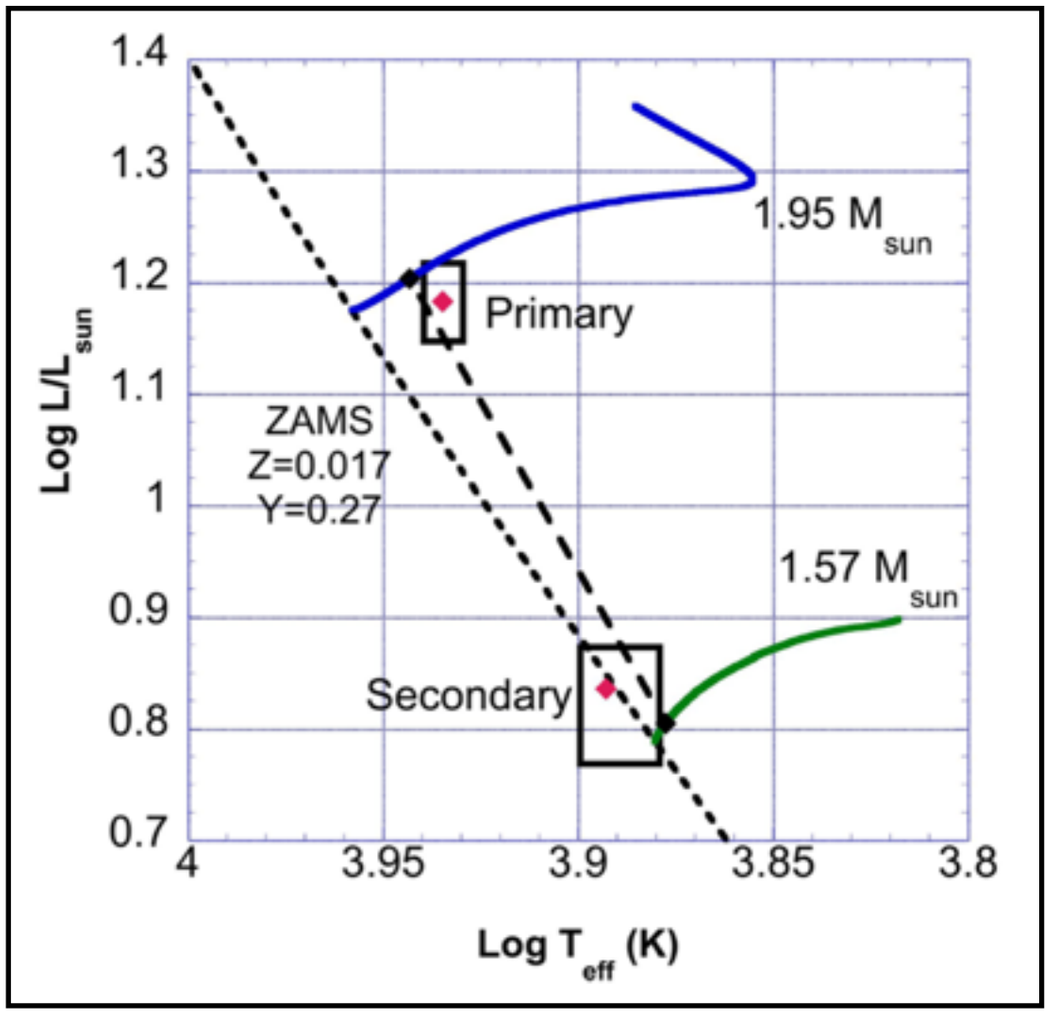
Why study pulsating stars in binaries?

- **Stellar parameters** from two independent methods
- **Tidal influence** on pulsations
- ***Kepler:*** High precision light curves of 2000+ eclipsing binaries



Parameters of KIC 4544587 (Hambleton+2013)

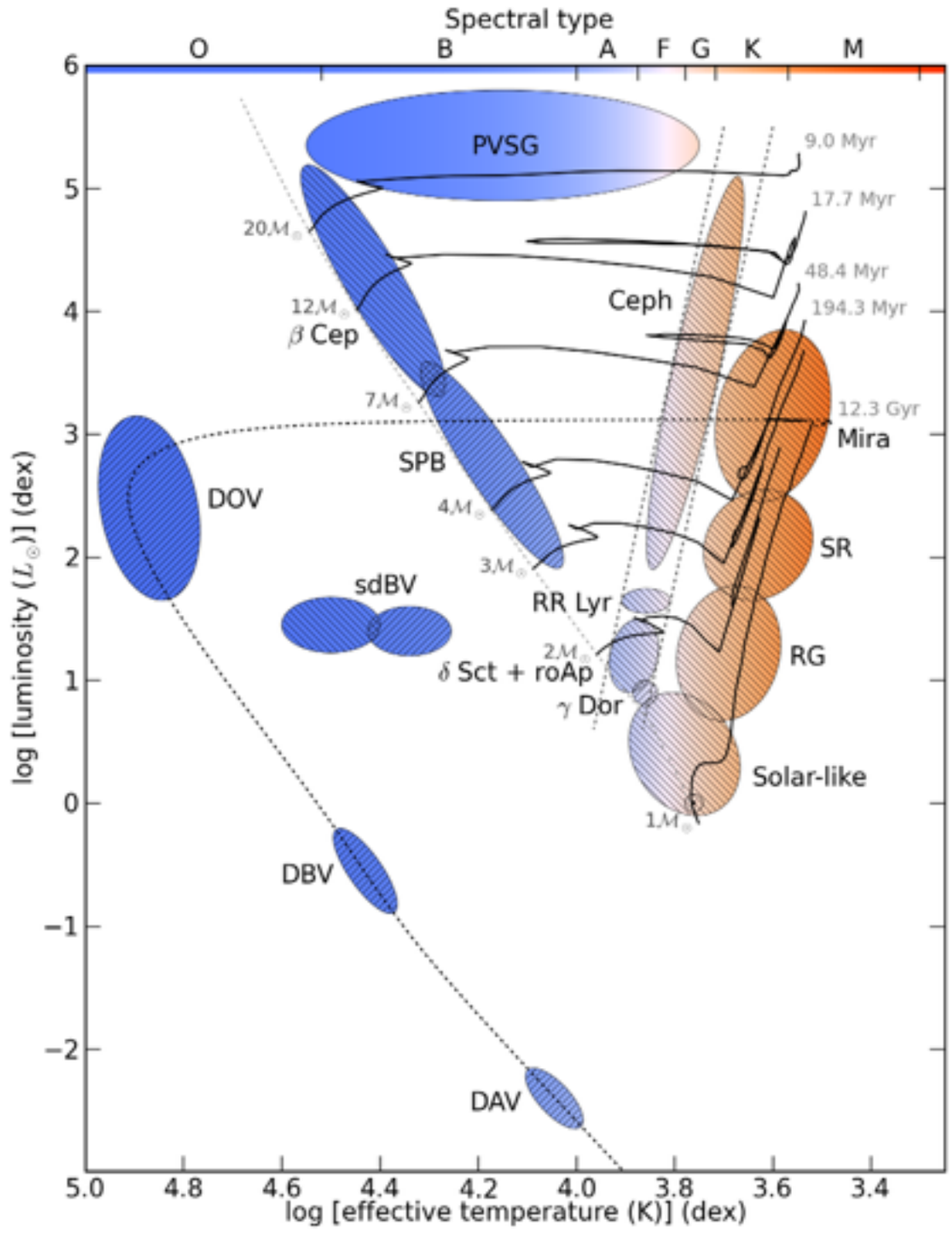
γ Dor and δ Sct pulsators

γ Dor: high-order g modes

- Periods: **0.5 to 3 d**
- Excitation: Convective flux blocking

δ Sct: low-order p modes

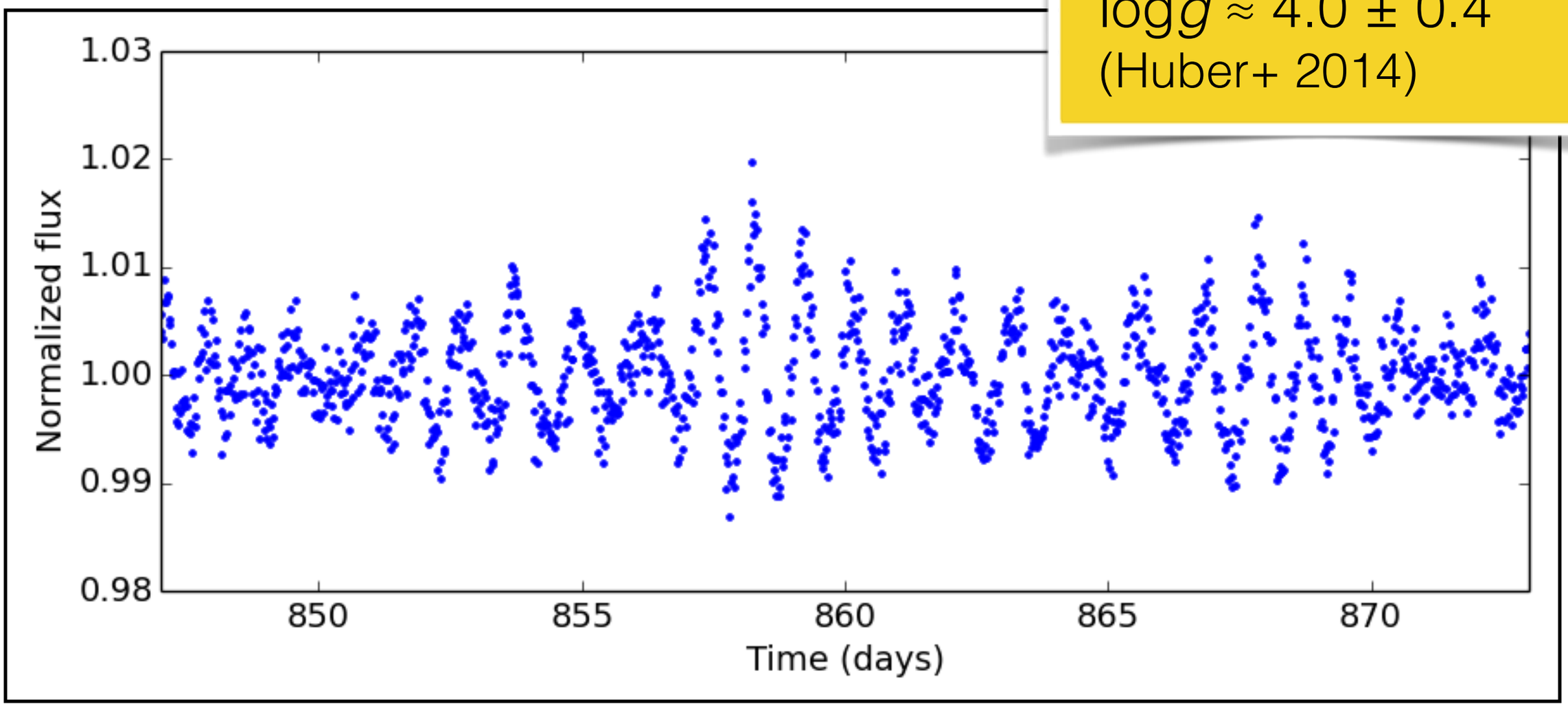
- Periods: **18 min to 8 hr**
- Excitation: κ mechanism



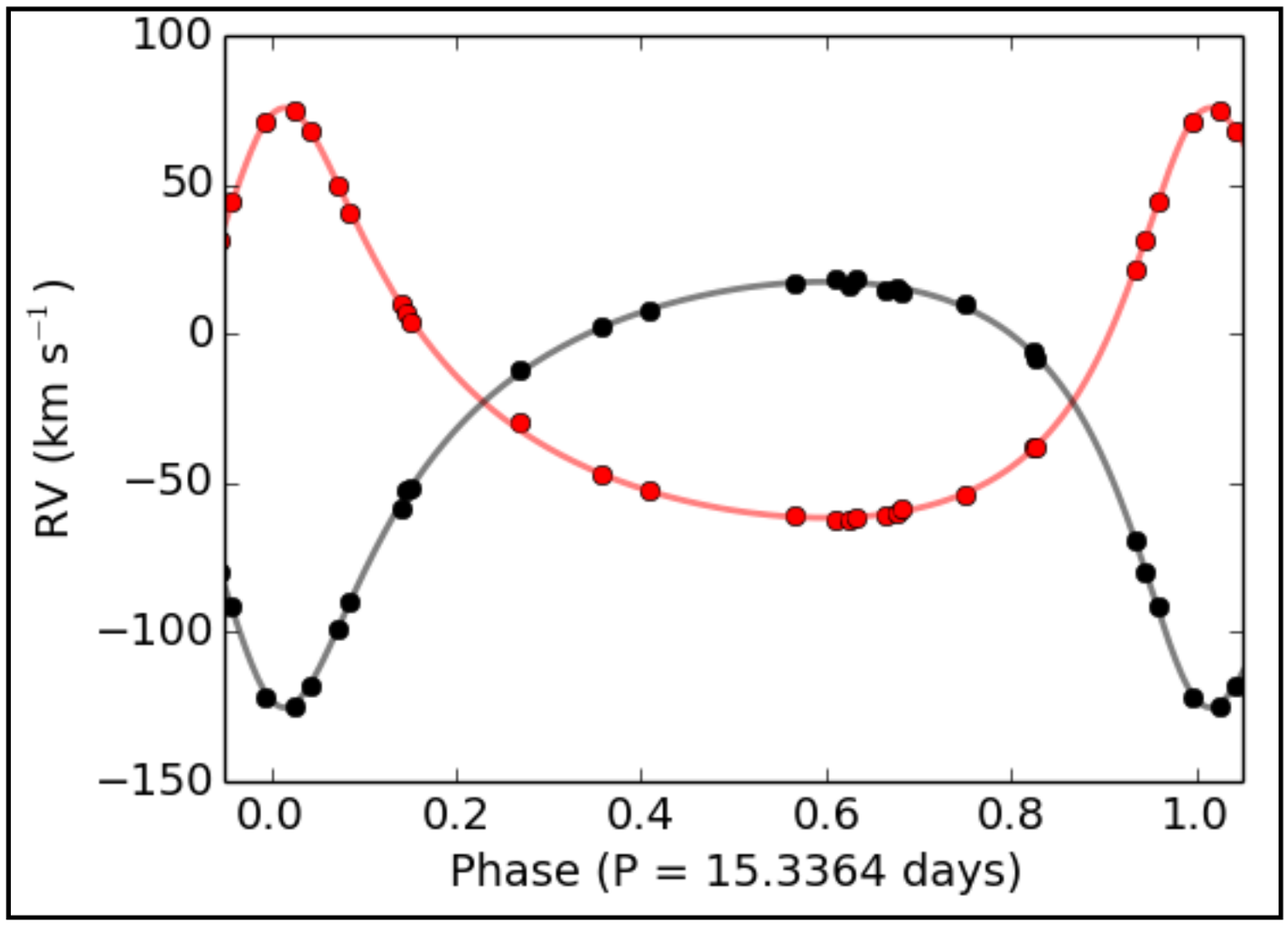
Courtesy of Péter I. Pápics

KIC 10080943: 4 years *Kepler*

$T_{\rm eff} \approx 7400 \pm 300$ K
$\log g \approx 4.0 \pm 0.4$
(Huber+ 2014)



KIC 10080943: eccentric binary

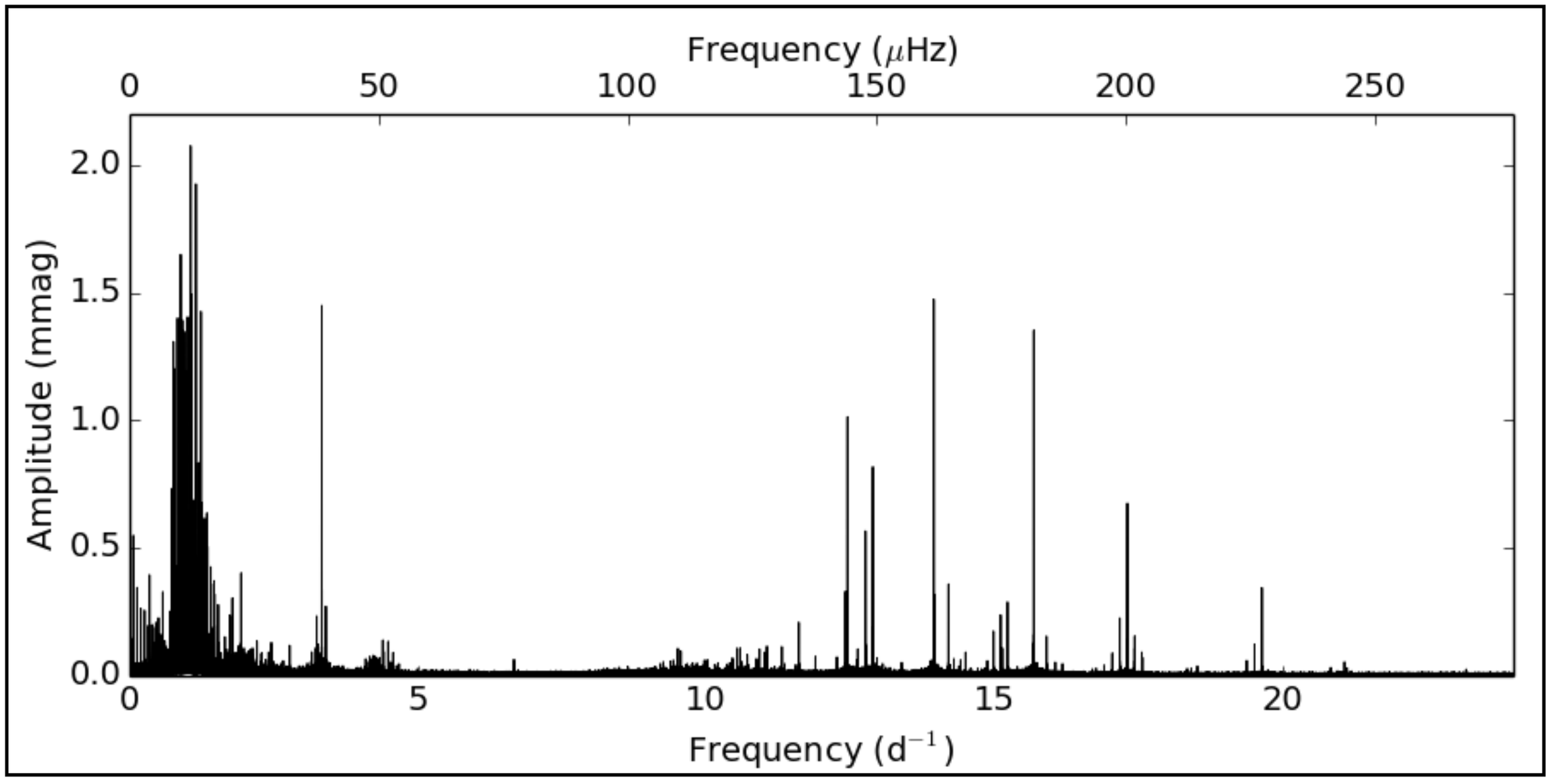


Binary parameters:

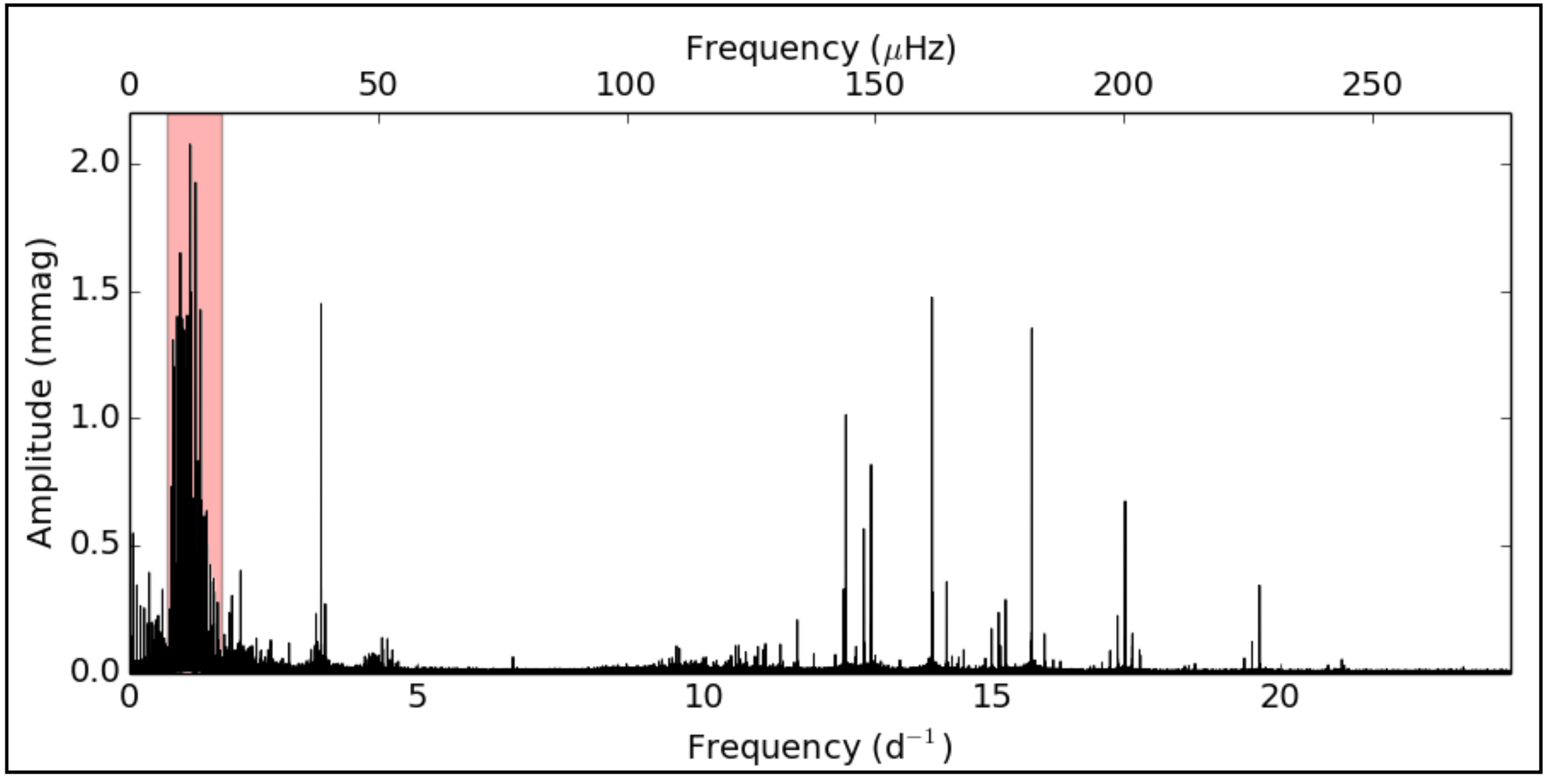
P = 15.3364 ± 0.0001 d
e = 0.453 ± 0.005
ω = 344.5 ± 0.6 deg
q = 0.962 ± 0.007
$a\sin i$ = 37.9 ± 0.2 $R_\odot$
γ = -22.6 ± 0.6 kms^{-1}

$v_1 \sin i$ = 13 ± 5 kms^{-1}
$v_2 \sin i$ = 10 ± 5 kms^{-1}

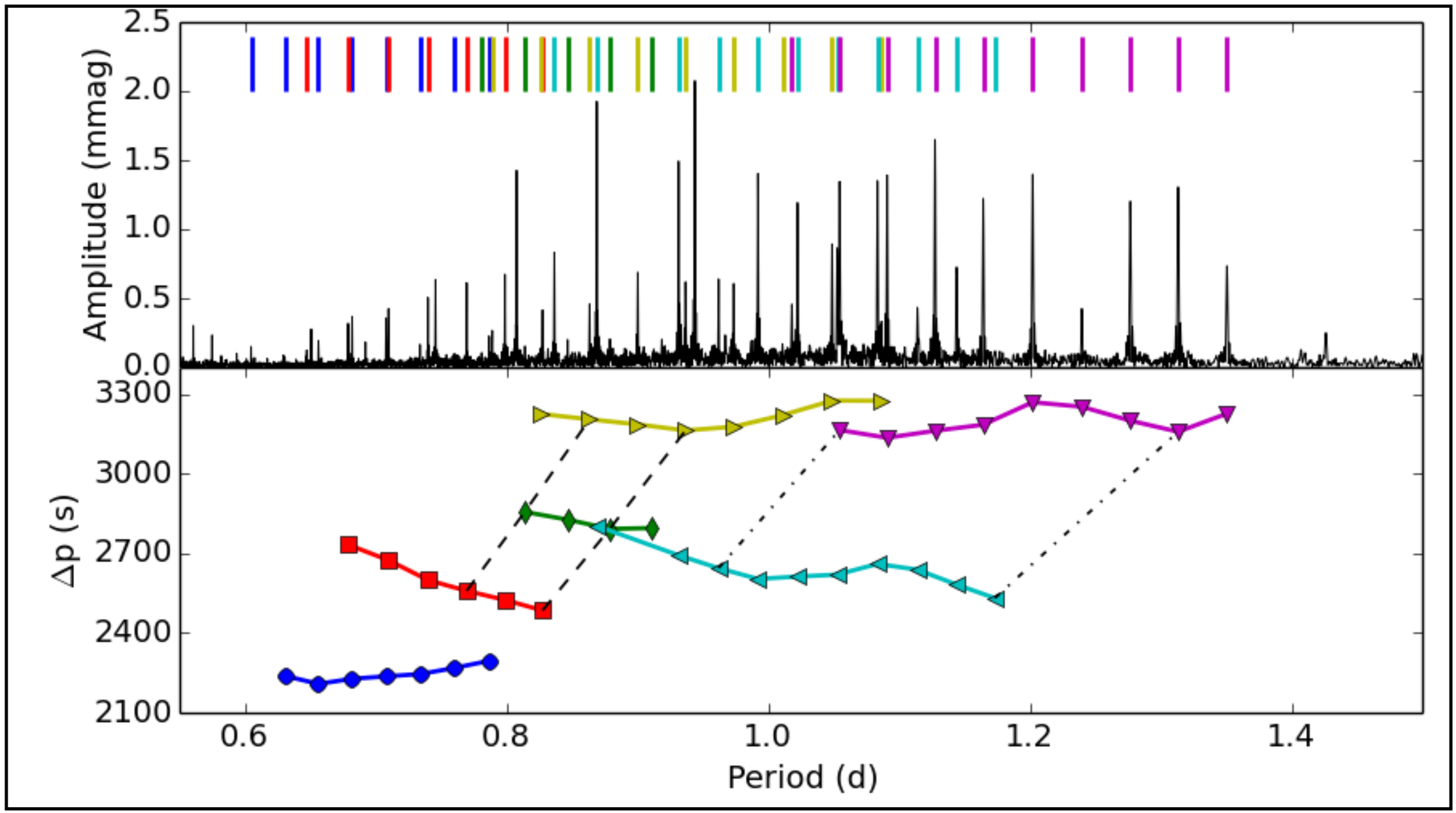
Fourier transform of *Kepler* data



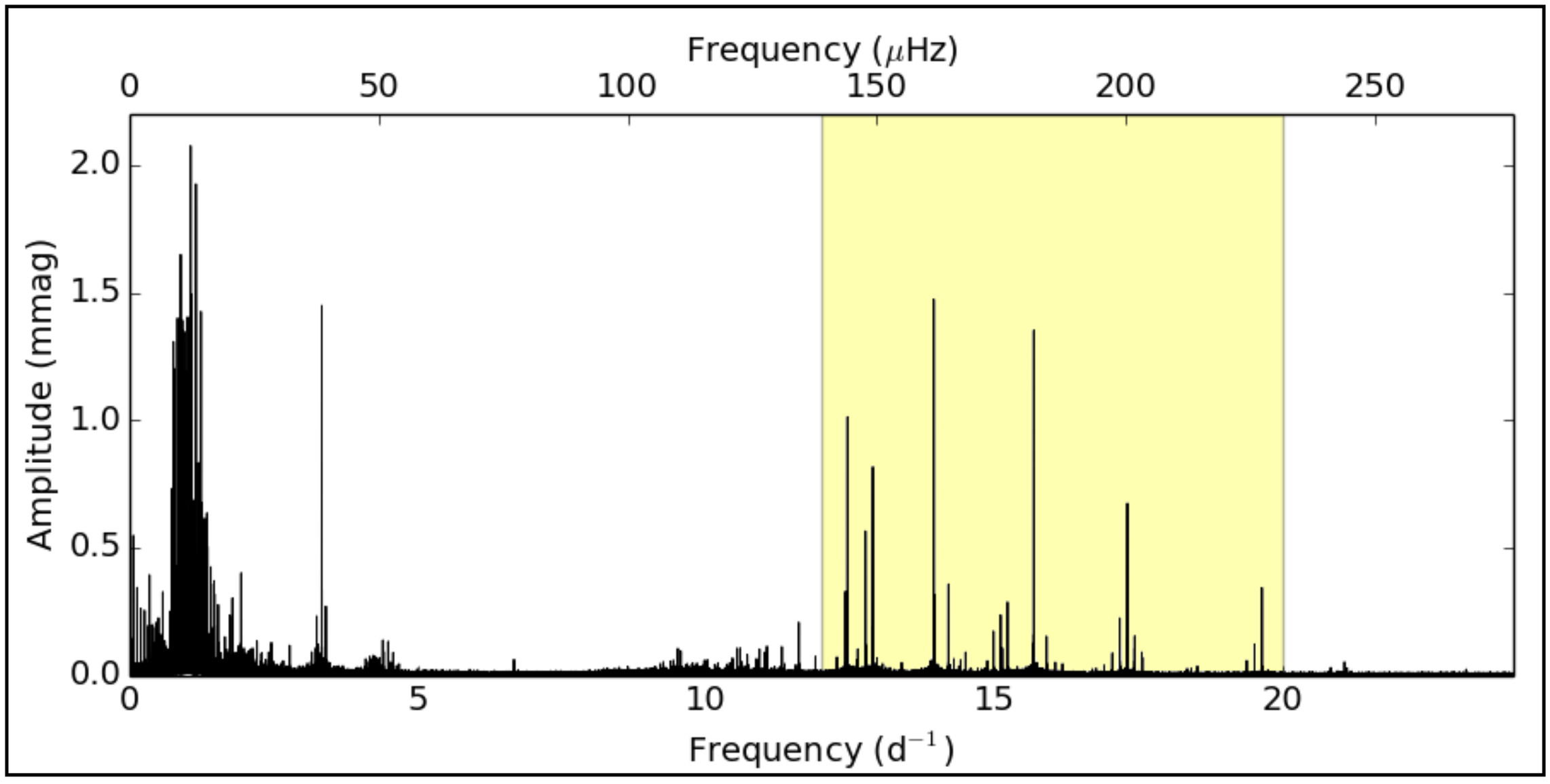
Fourier transform of *Kepler* data



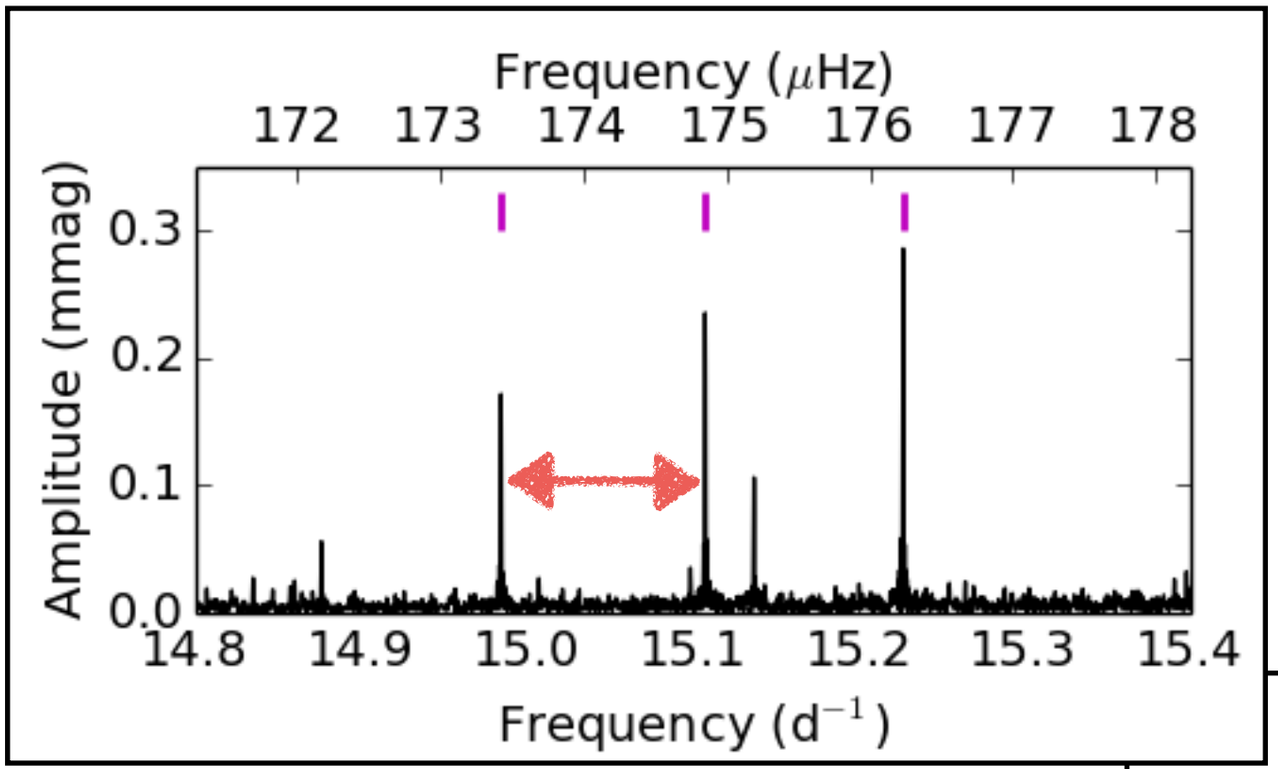
Period spacings in the g mode regime



Fourier transform of *Kepler* data

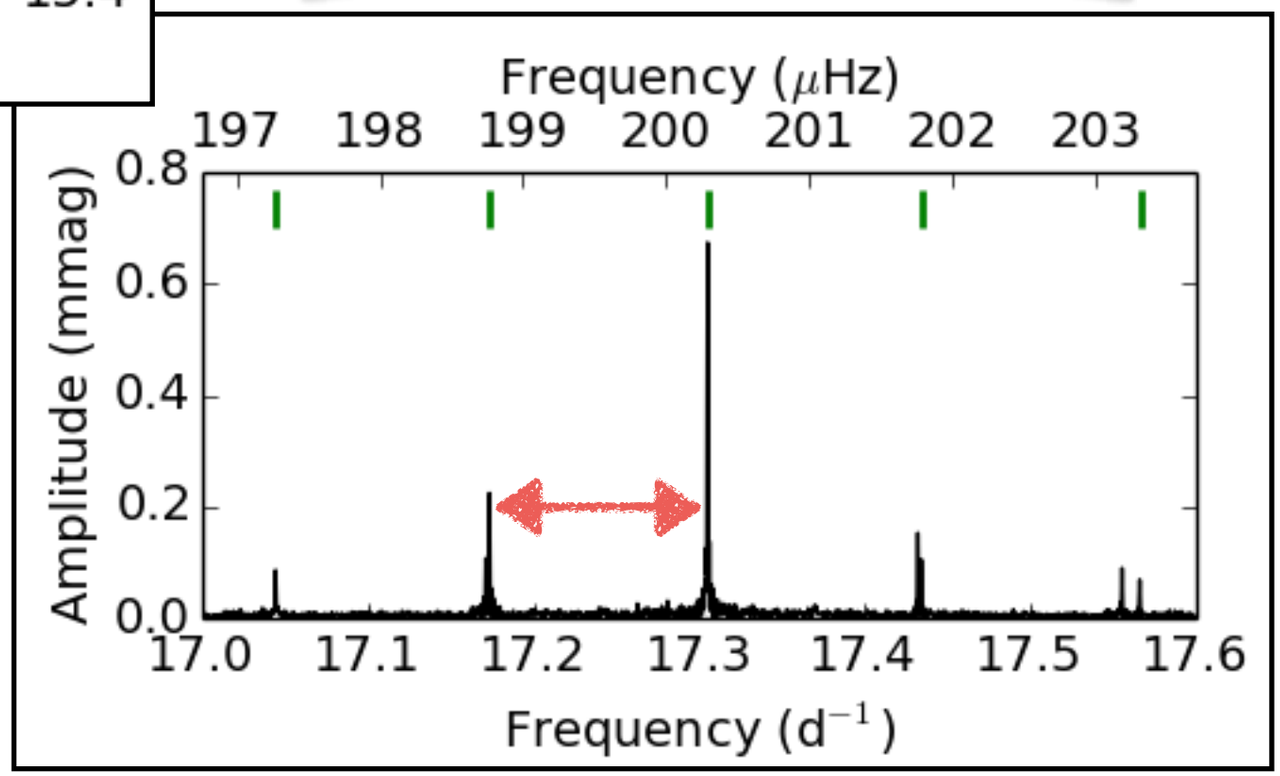


Rotational splittings in the p mode regime

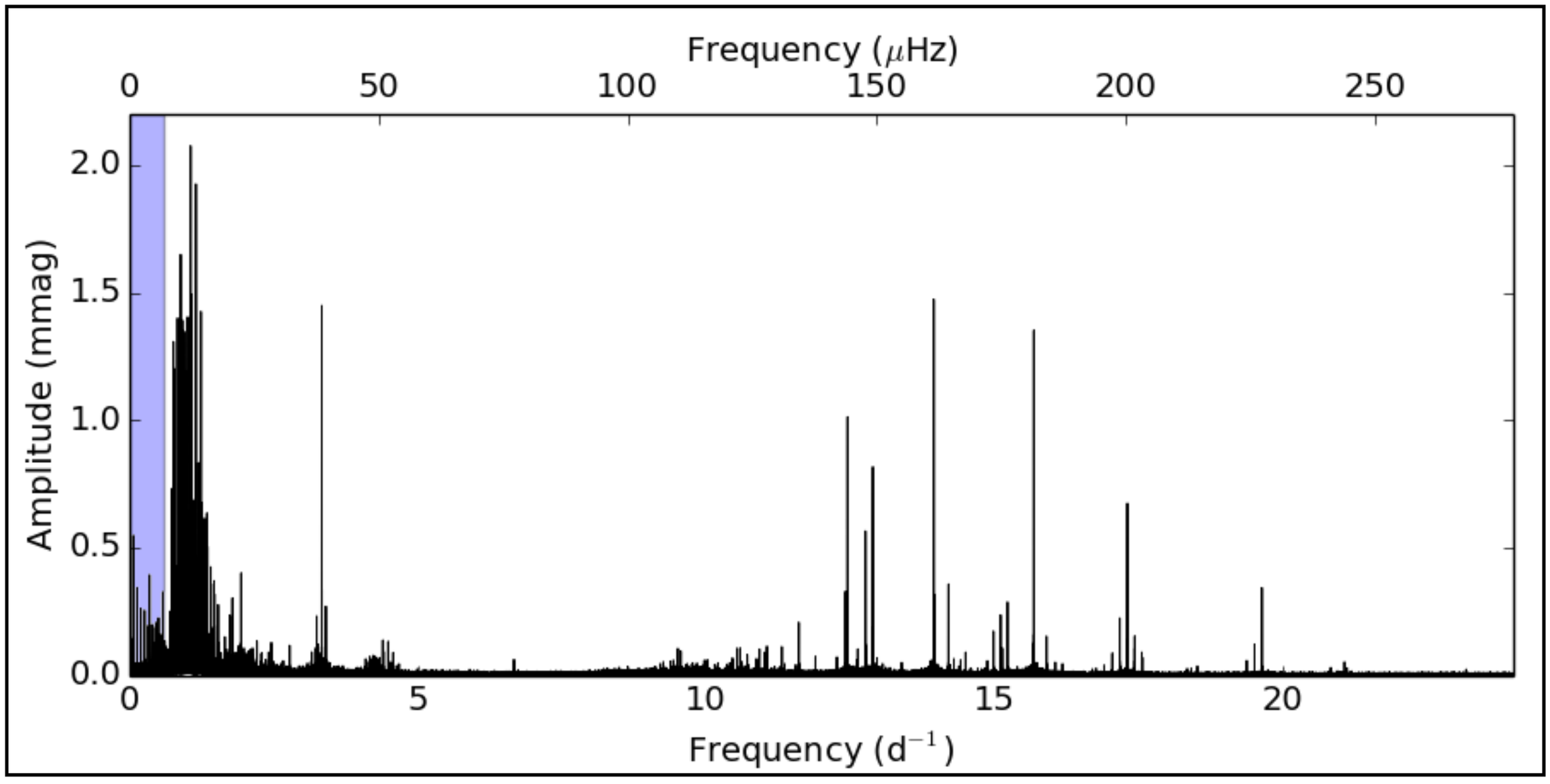


$\Delta f_1 \approx 0.1304$ d^{-1}
≈ 1.5094 μHz

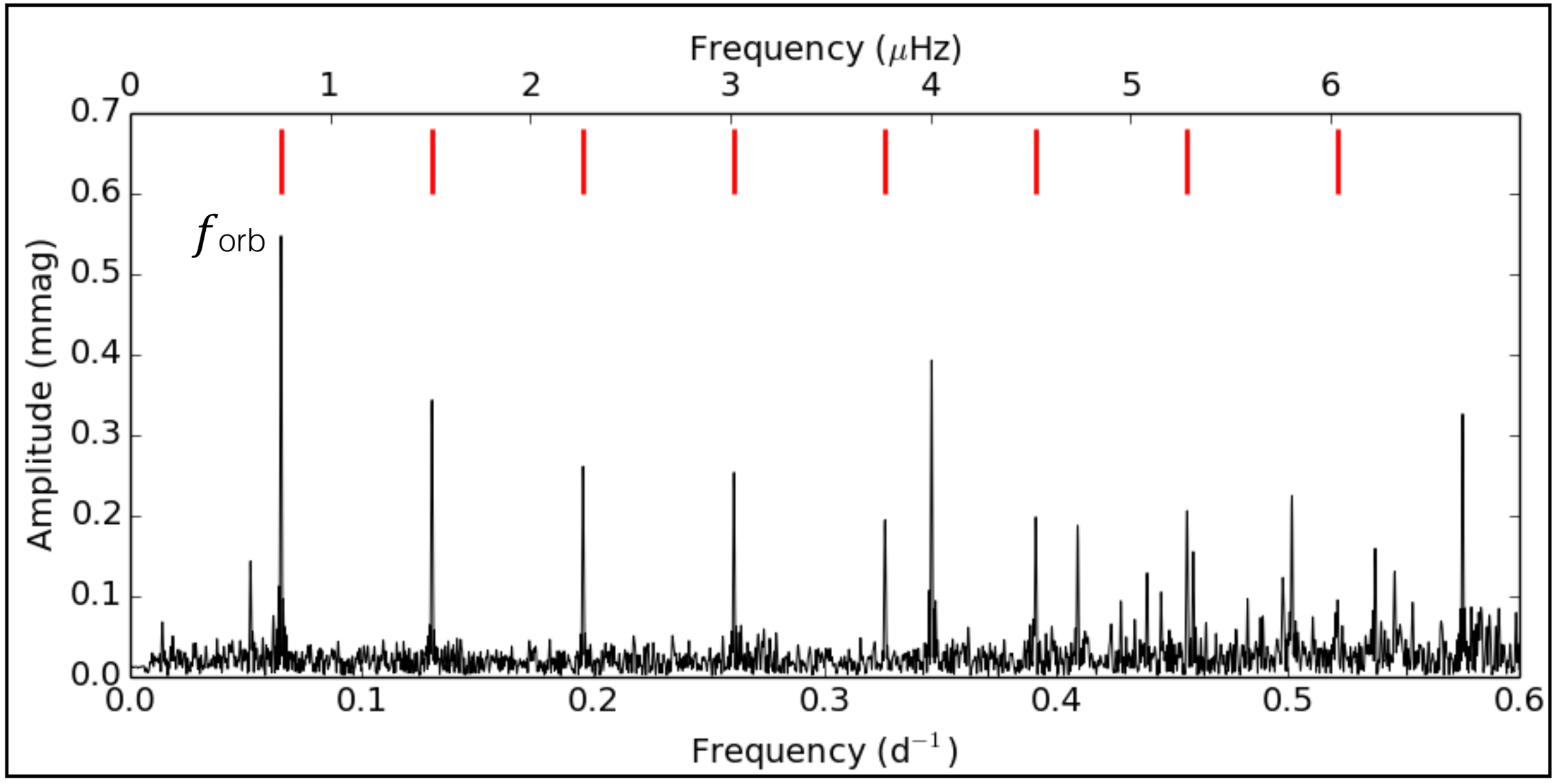
$\Delta f_2 \approx 0.1213$ d^{-1}
≈ 1.4035 μHz



Fourier transform of *Kepler* data

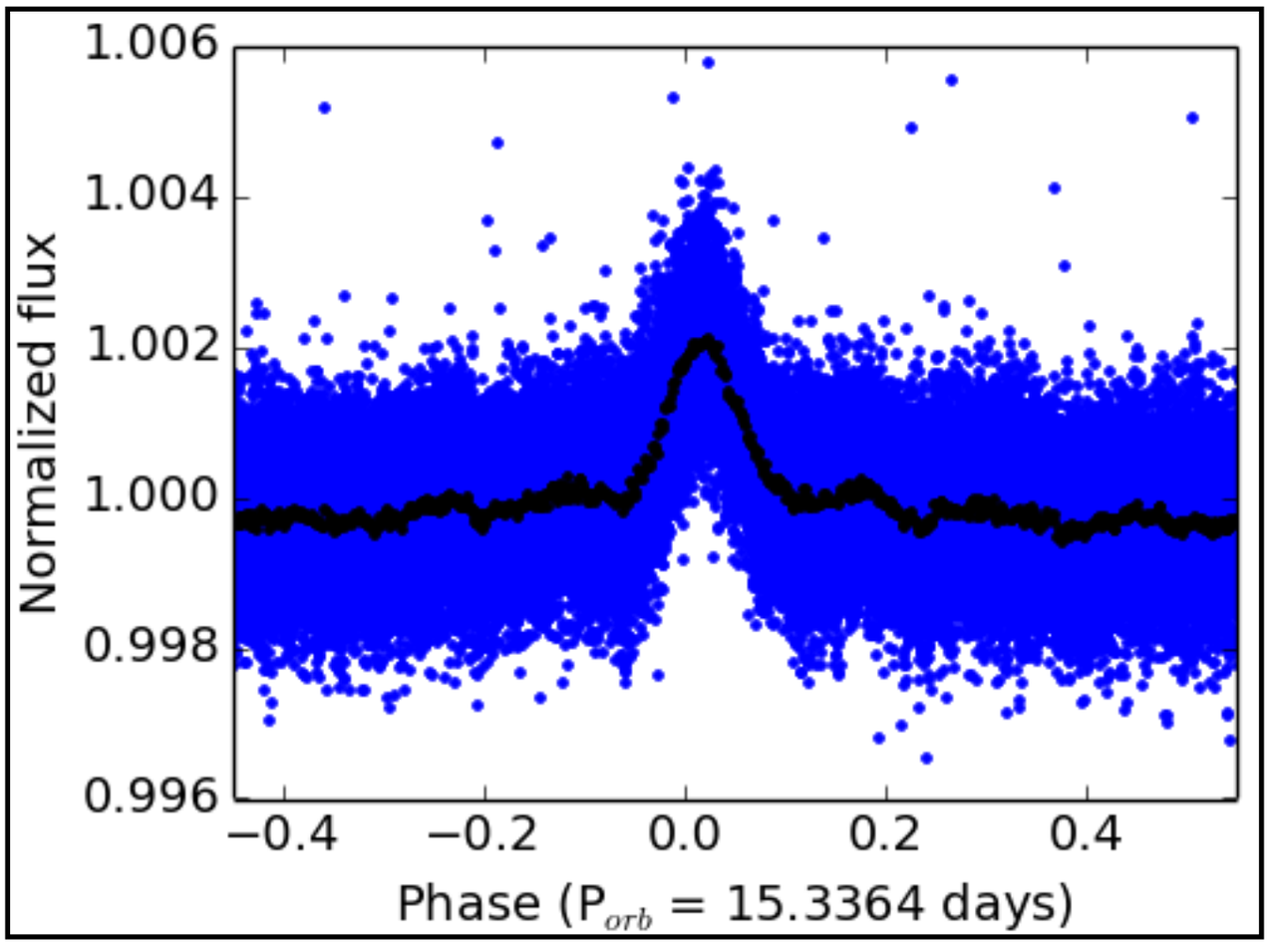


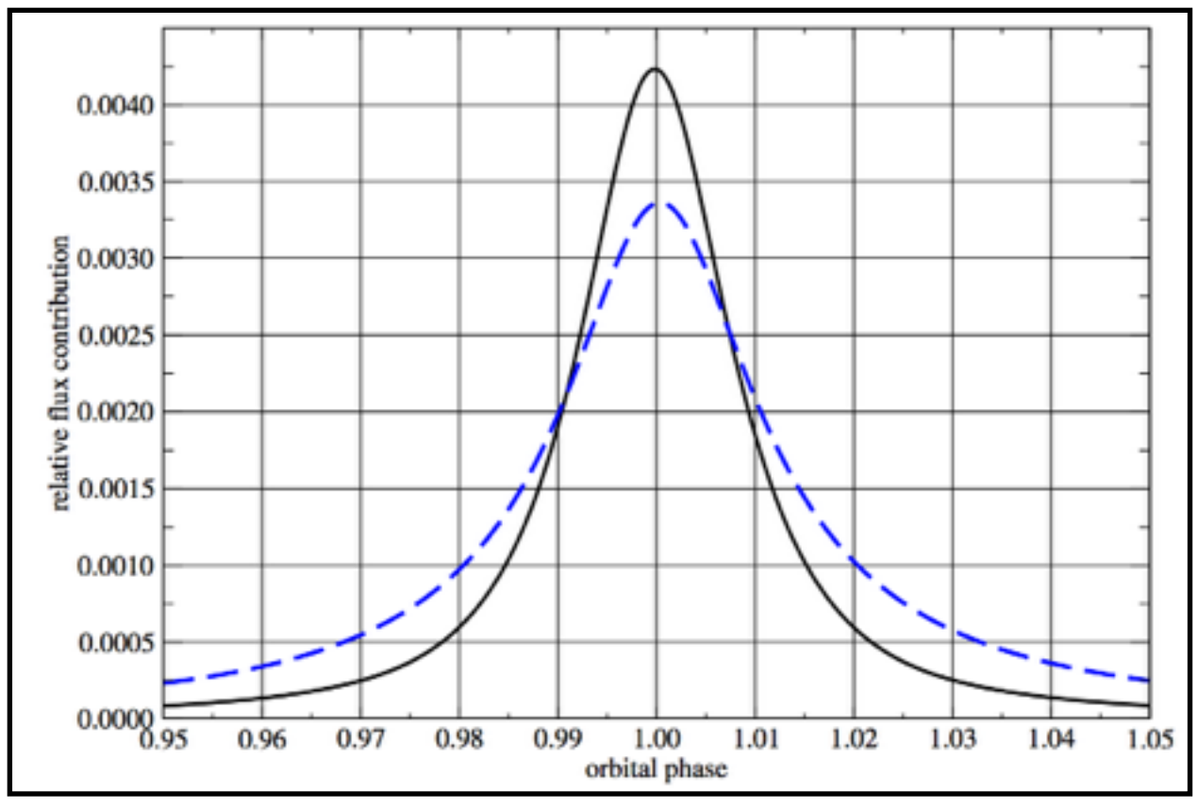
Harmonics of orbital frequency



Binary model of light curve

KIC 10080943





Tidal distortion vs. **Reflection**

(KOI-54, Welsh+ 2011)

Ongoing and future work

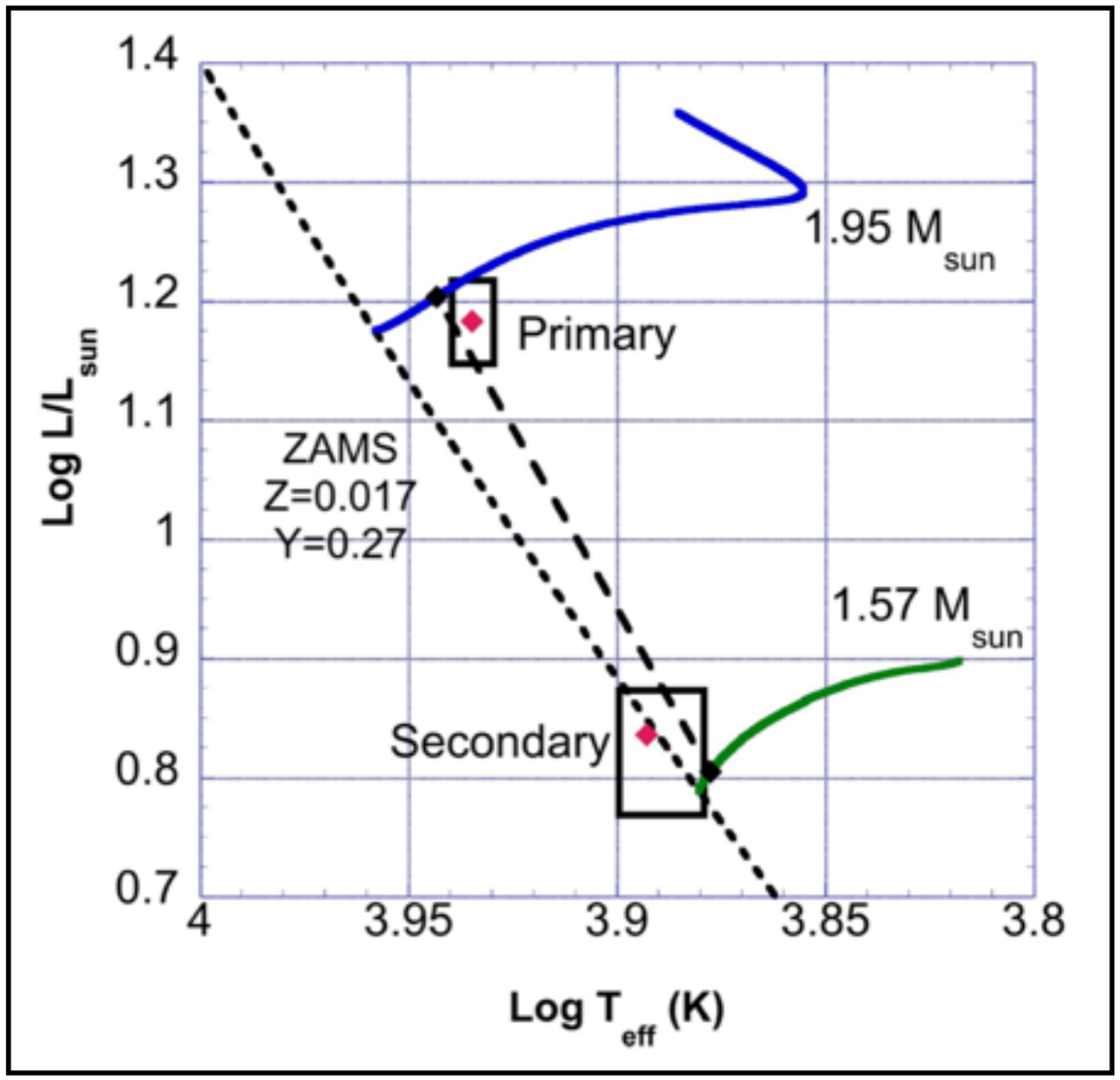
- **Modelling brightening** with PHOEBE 2.0

- **Seismic modelling** with

MESA

GYRE

- Do similar work for other stars.



Parameters of KIC 4544587
(Hambleton+2013)