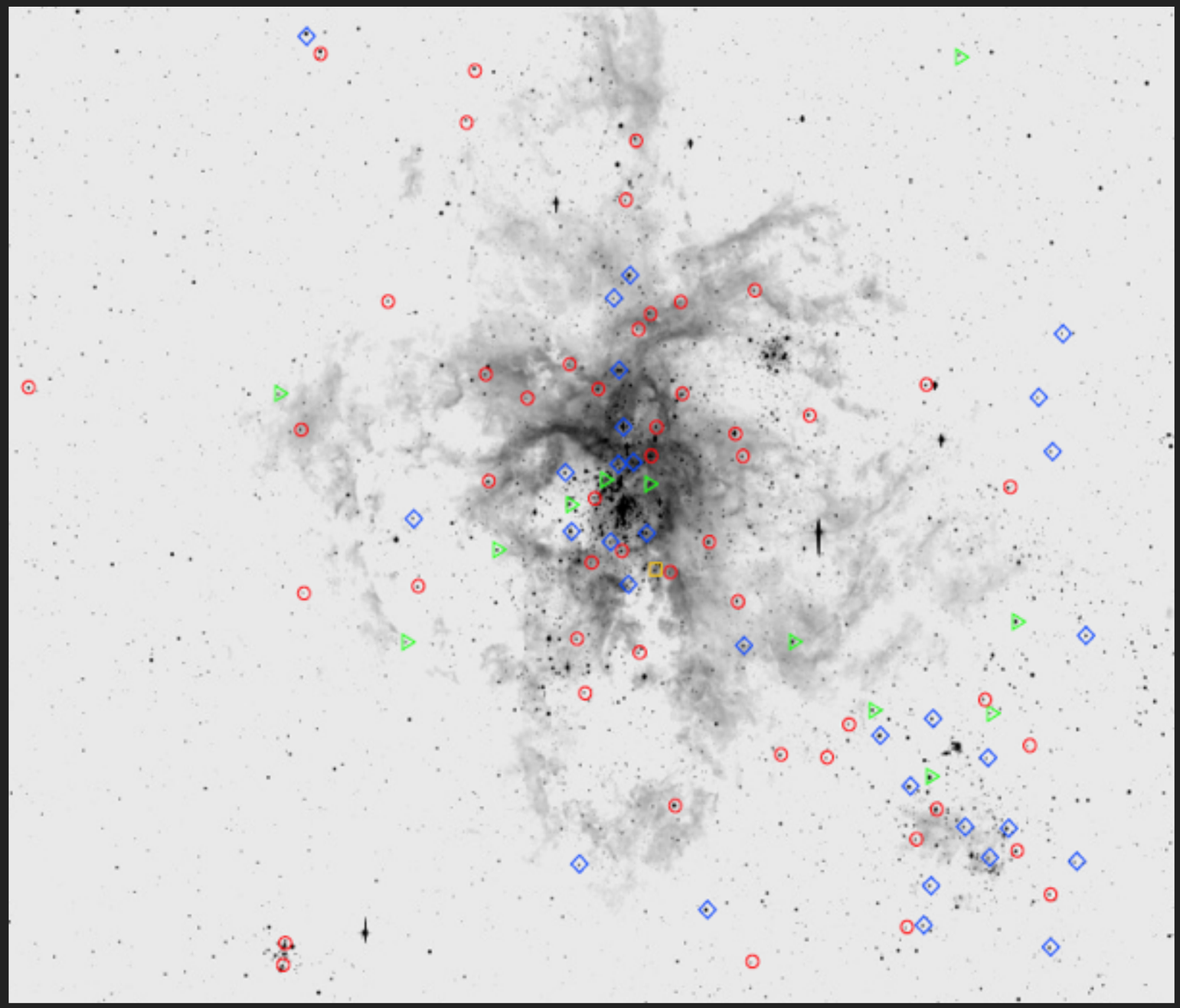
LAURENT MAHY - KU LEUVEN

ATMOSPHERIC ANALYSIS OF TMBM SB2 SYSTEMS

SAMPLE:

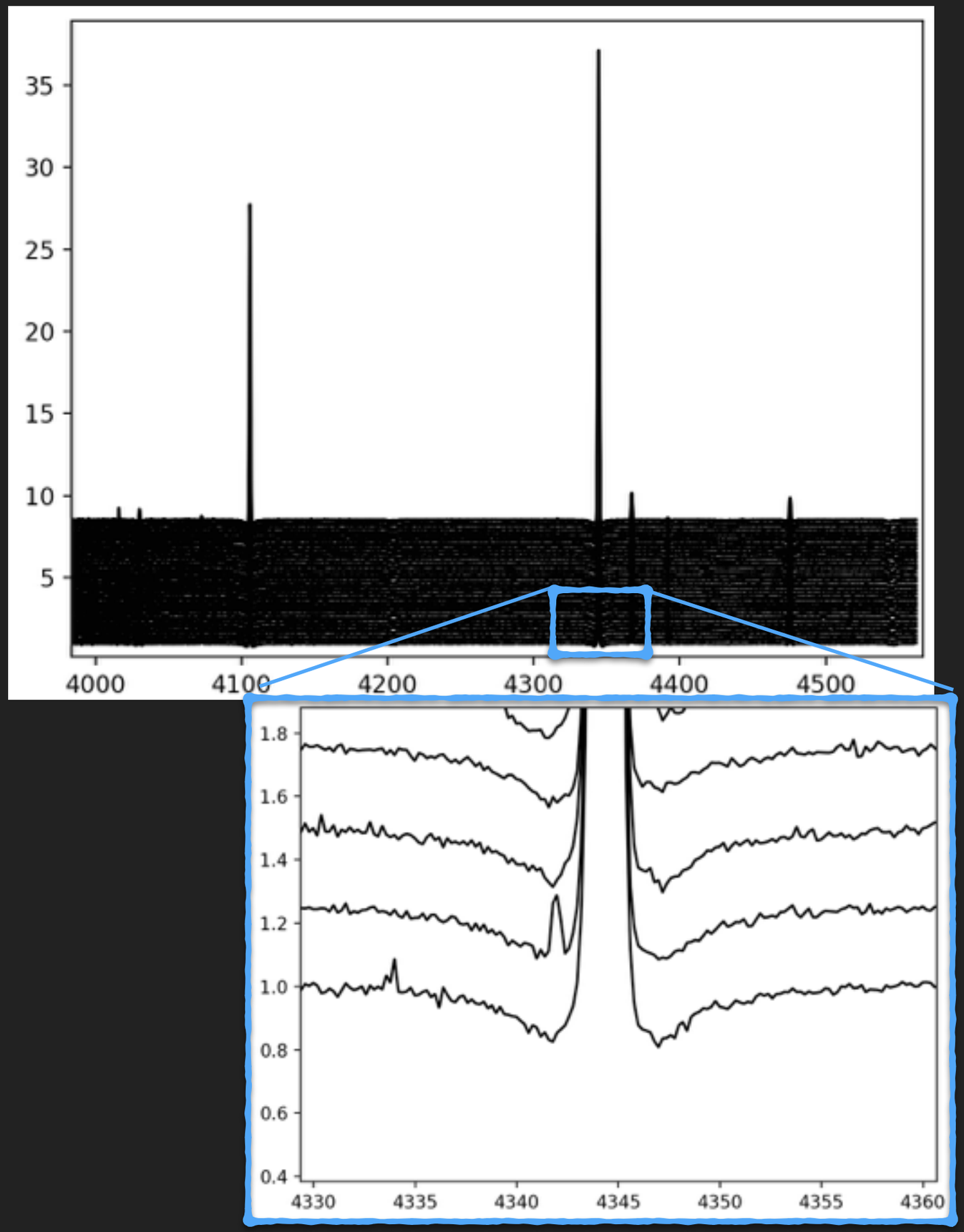
- TMBM:
  - 32 epochs
  - FLAMES spectra [3950:4560] A
- 31 SB2 systems:
  - ✳ 19 spectroscopic
  - ✳ 12 photometric
    - ➡ 5 showing eclipses
    - ➡ 2 (over-)contact
    - ➡ 7 ellipsoidal var.



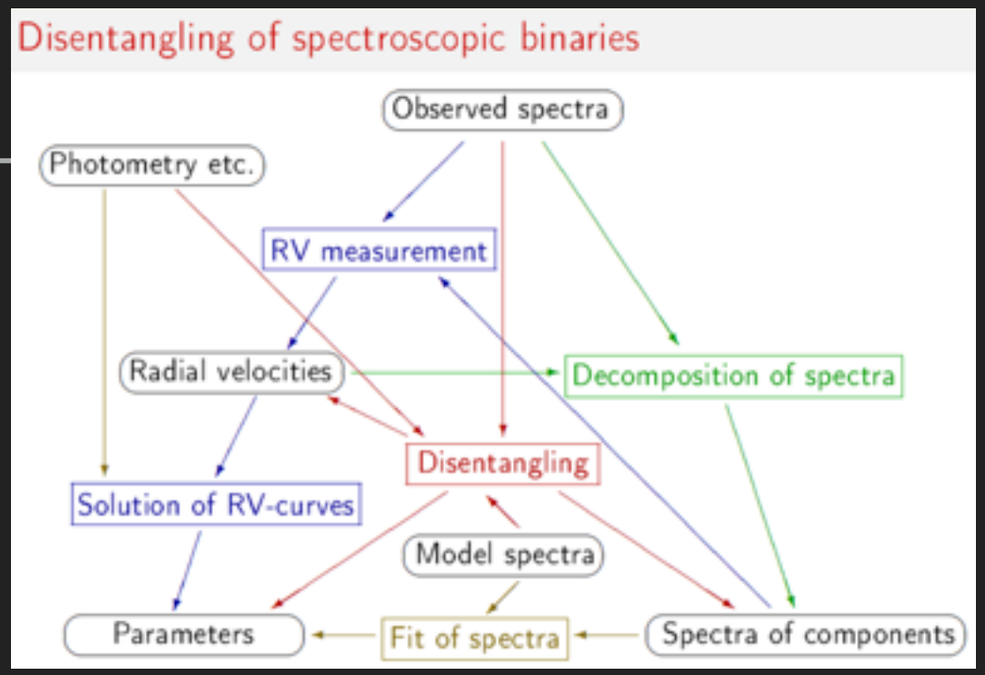
Almeida et al. (2017)

NEBULAR CONTAMINATION

- For some systems, nebular contamination is too large to correctly reproduce the cores of the lines



METHODOLOGY:



Pavlovski & Hensberge (2009)

- Almeida et al. (2017) measured the radial velocities for all the epochs and compute the orbital periods, mass ratios, and eccentricities
- Use Orbital solutions from Almeida et al. (2017) as inputs
- Fourier spectral disentangling (Simon & Sturm 1994, Ilijic et al. 2004)
  - ★ Nebular contamination - line clipping is forbidden
  - ★ 3-component disentangling to estimate the nebular lines
  - ★ Estimation of the scaling
  - ★ Use the scaling factors as light factor for the nebular lines

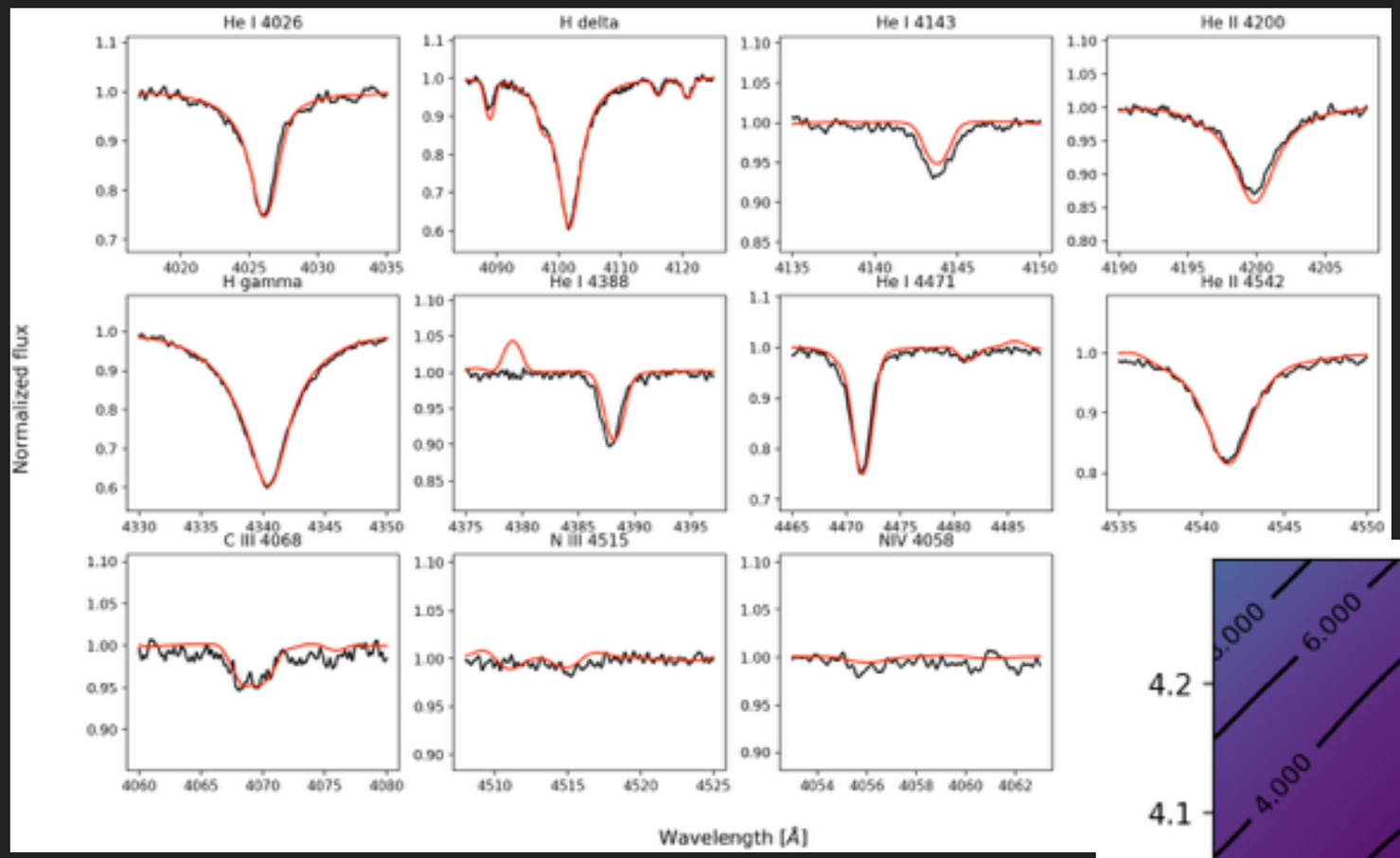
➡ The S/N of extracted spectra are higher than the observed ones

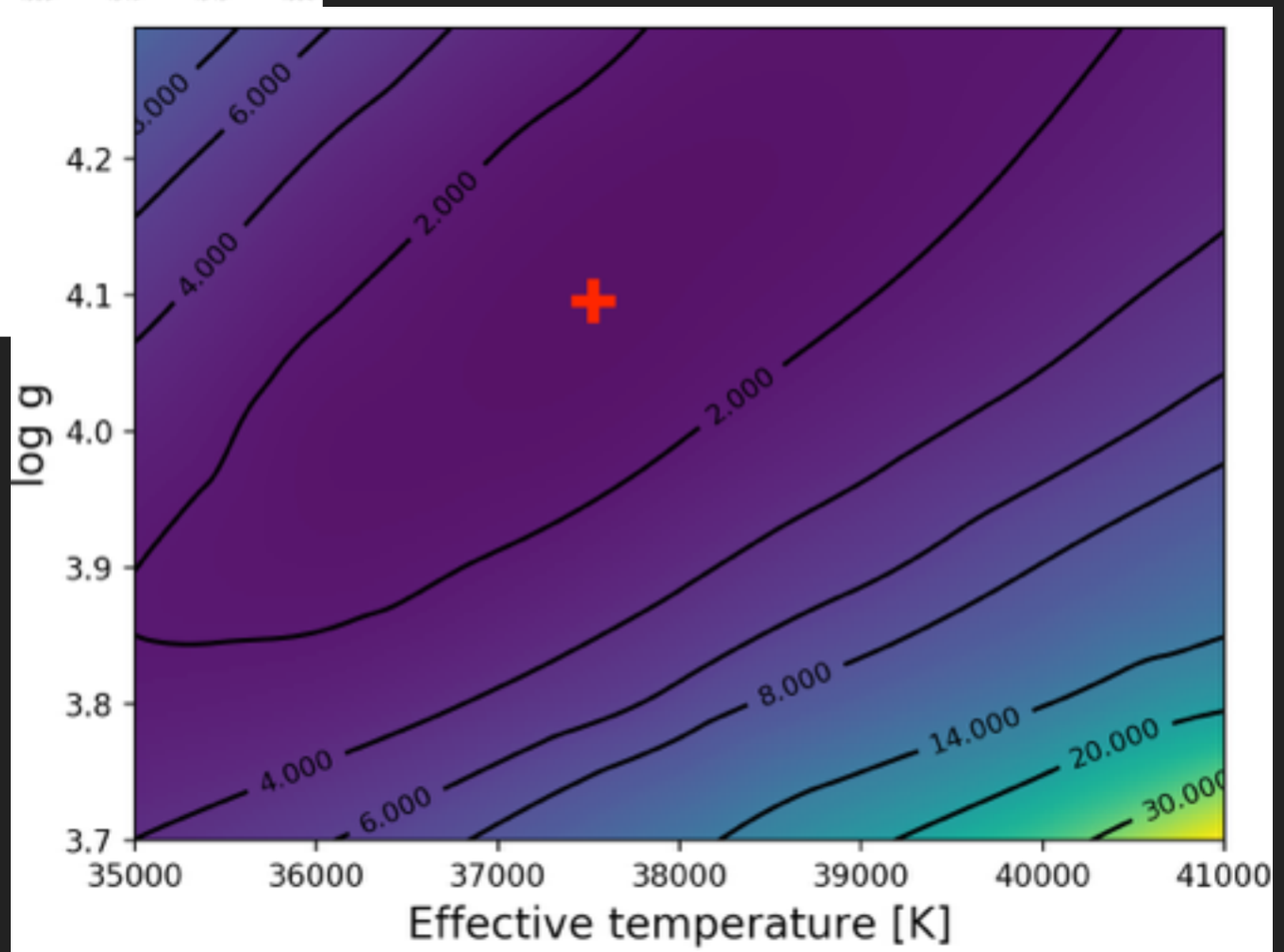
$$(S/N)_{ext} \sim (S/N)_{obs} \times Nobs^{0.5}$$

METHODOLOGY:

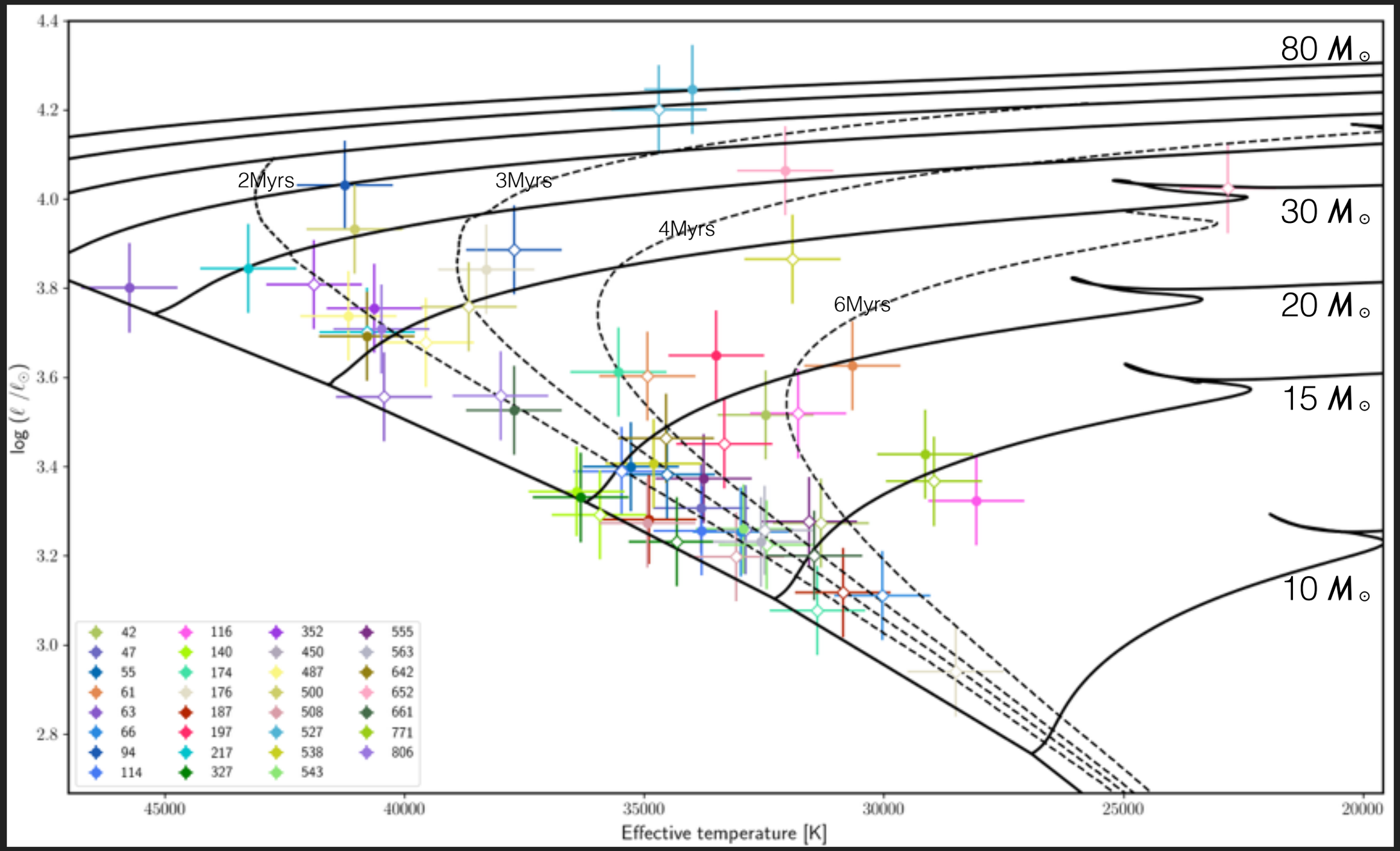
- Use the CMFGEN atmosphere code (Hillier & Miller 1998)
  - ★ Determination of the Teff, log g
  - ★ Determination of the C and N abundances - no O lines
  - ★ Hydrogen and Helium lines used to scale the disentangling spectra for non-photometric systems i.e. $l_1+l_2 = 1$.
  - ★ v sin i and v_{mac} determined from Simon-Diaz & Herrero (2014)
  - ★ For some systems, no indication of the wind parameters
- Comparaison with BONNSAI for the theoretically predicted values

ATMOSPHERIC ANALYSIS OF TMBM SB2 SYSTEMS





SPECTROSCOPIC HERTZSPRUNG–RUSSELL DIAGRAM

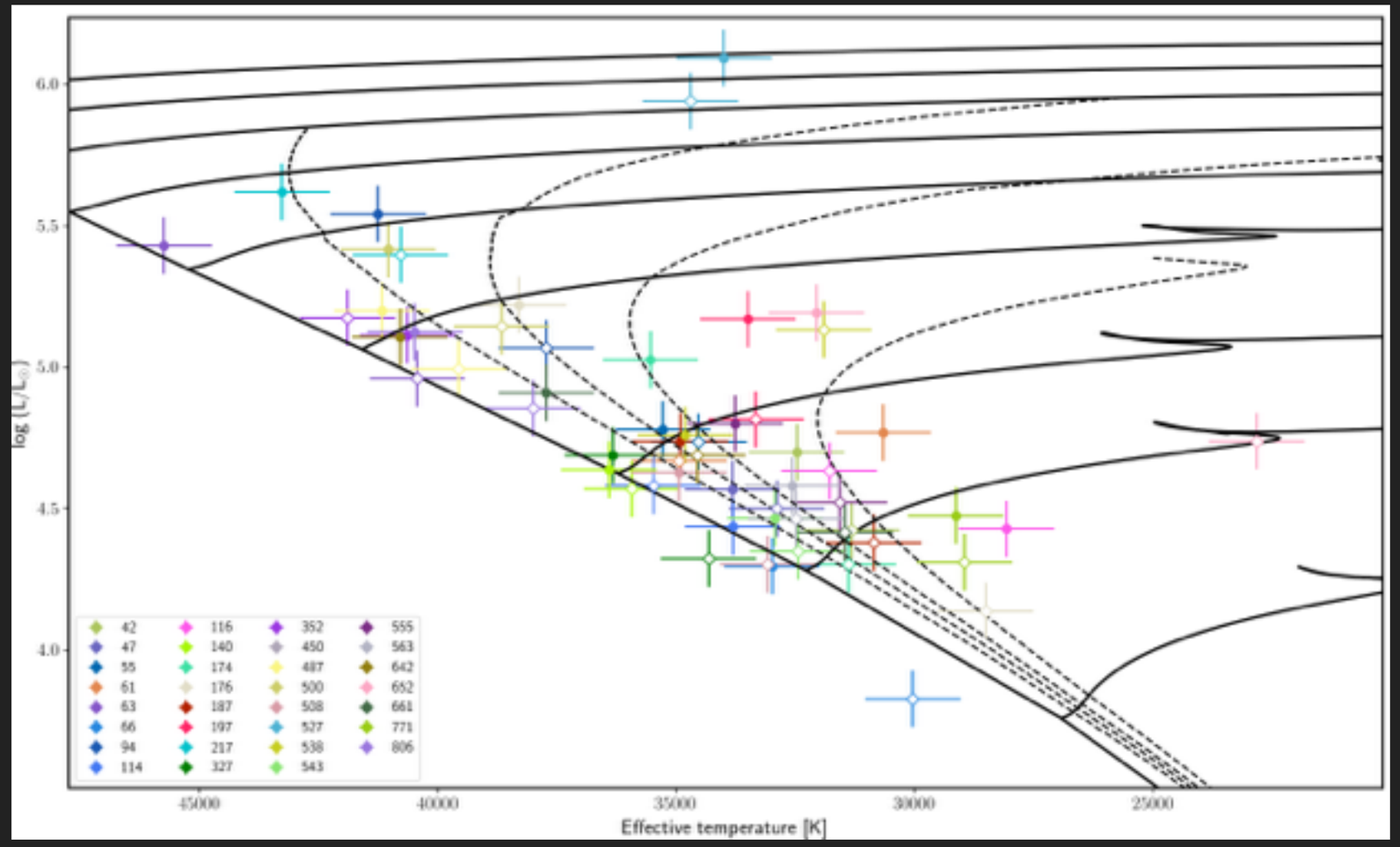


PROBLEMATIC OF THE LUMINOSITY:

- Distance of the LMC is known but uncertainties on A_V , mainly due to R_V
- Possible solution is to use A_K but not possible to determine the flux ratios for the different systems in the K band to determine the individual luminosities
- Other solution:

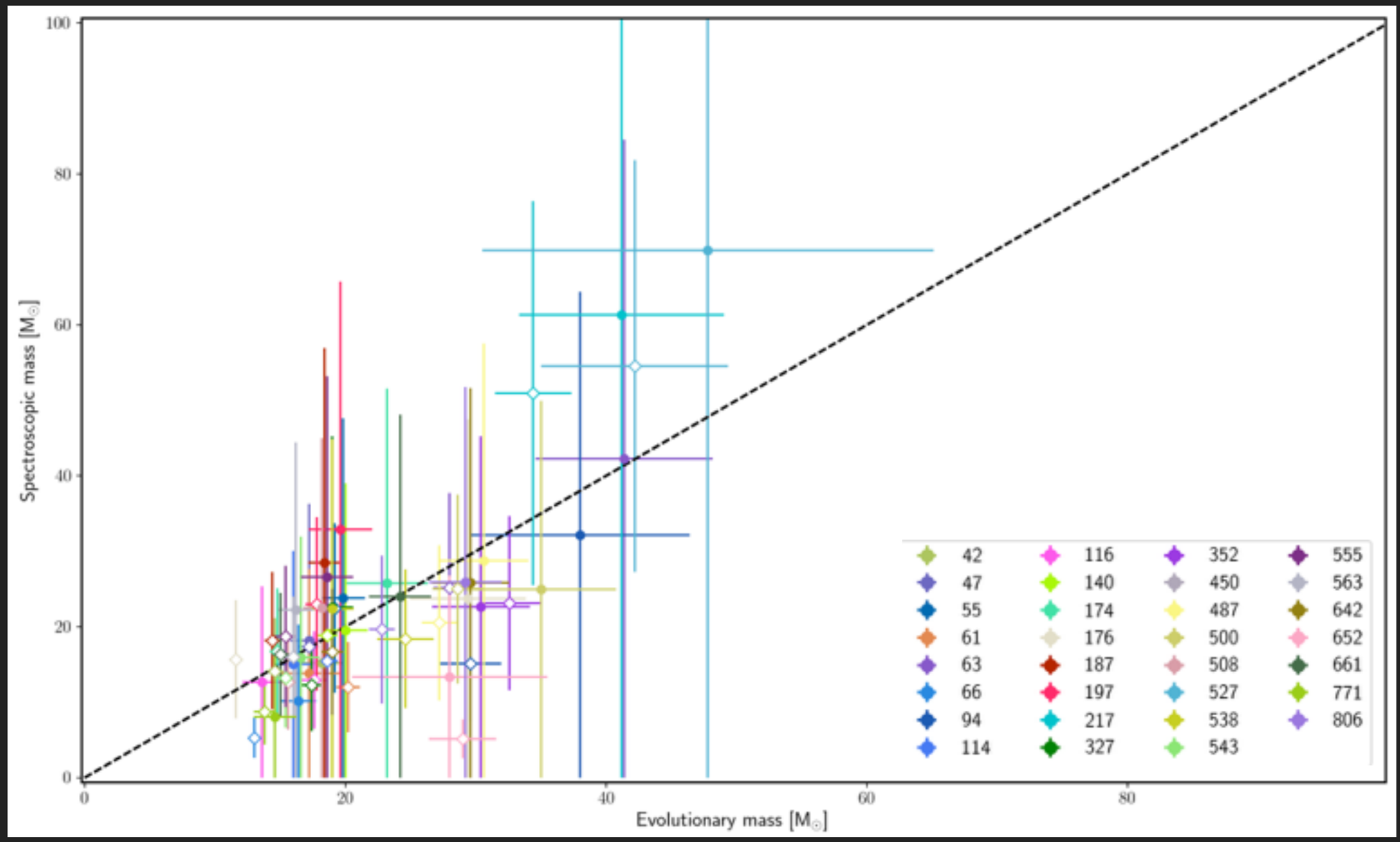
Use the individual SED and recombine them to fit the observed one

but
U mag can be missing for some objects



MASS DISCREPANCY

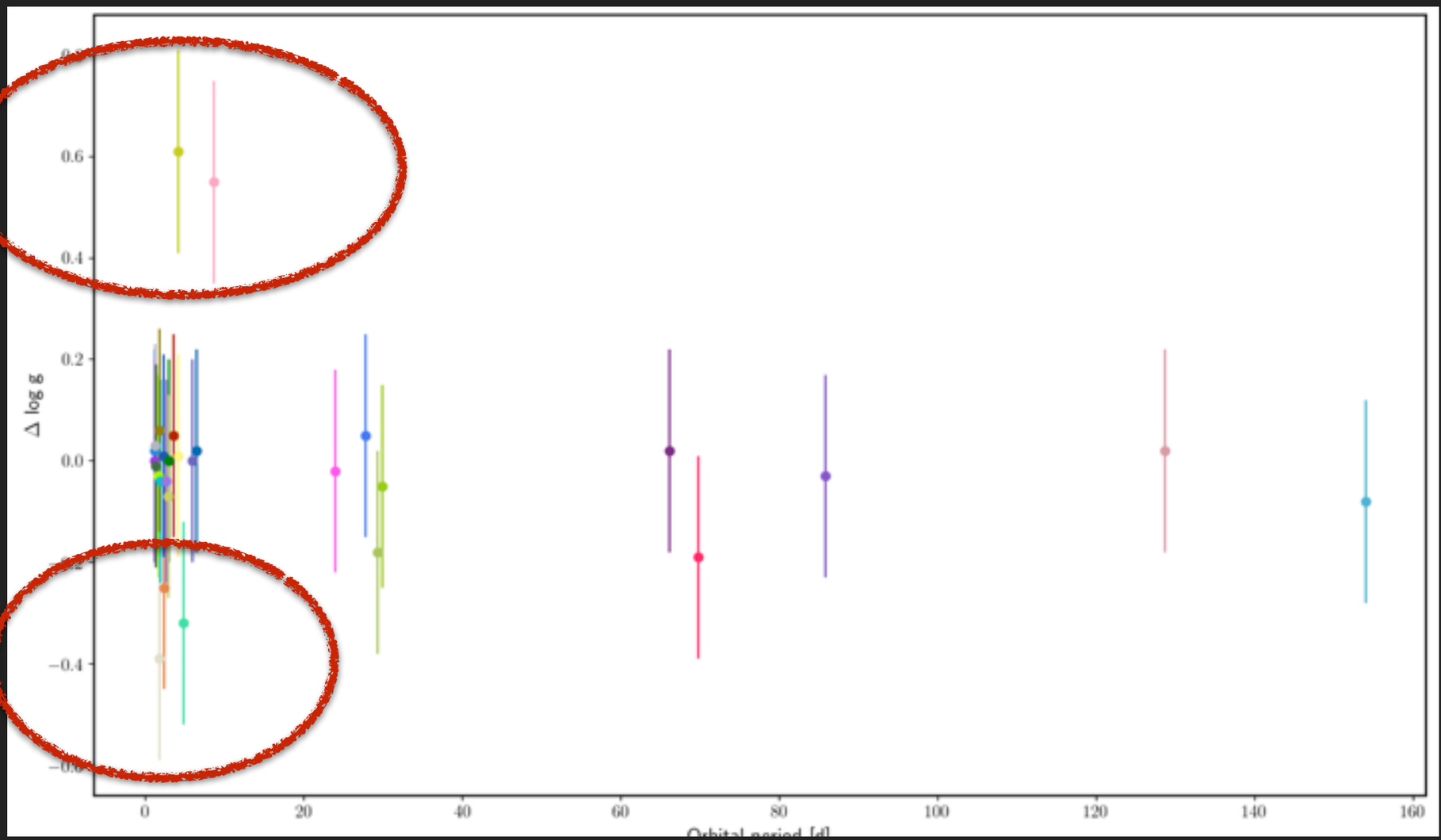
- If the luminosities of the objects are closed to the predicted ones (BONNSAI) …



INTERACTING SYSTEMS:

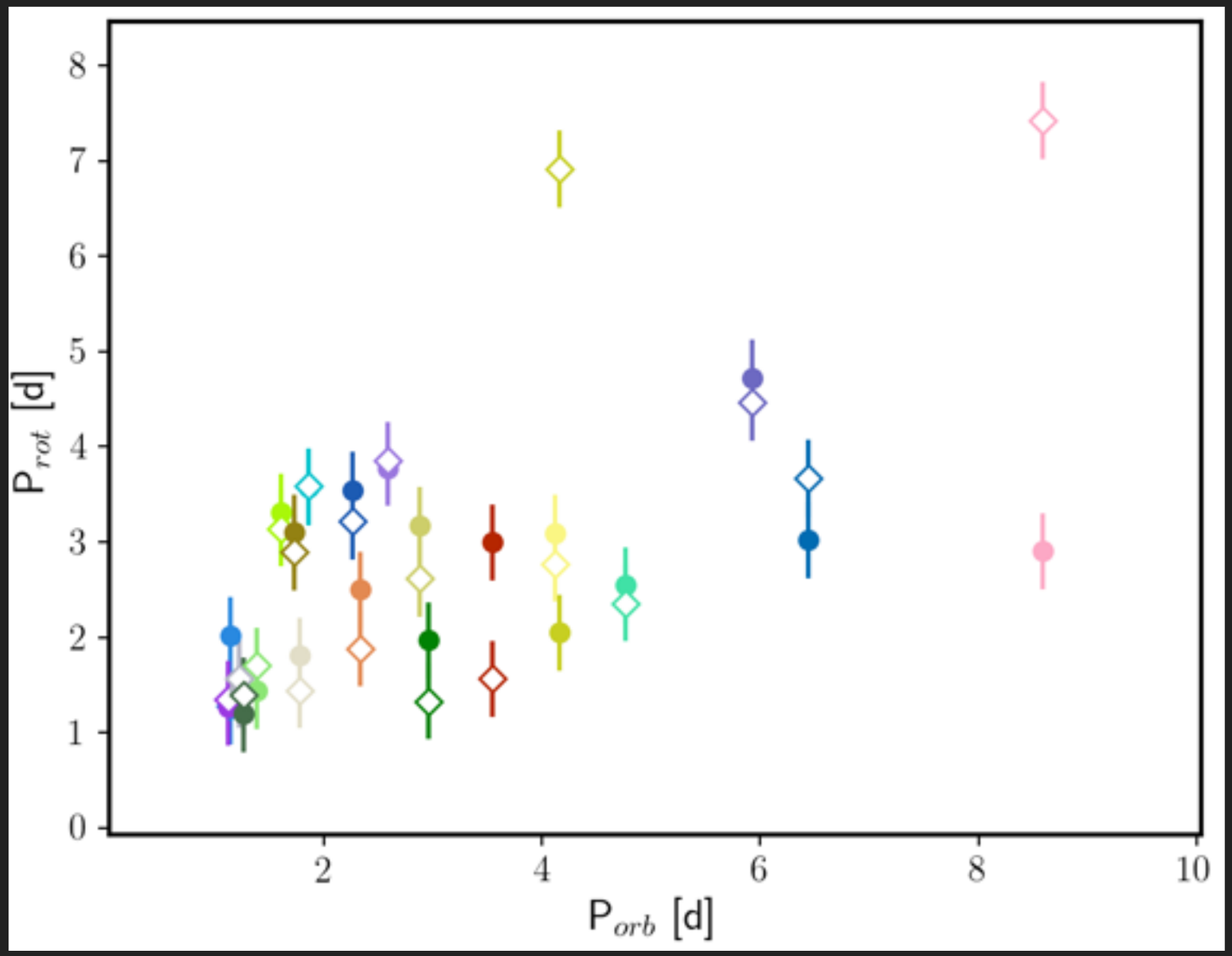
- P vs. log g diagram

Some outliers indicating possible interactions: VFTS 061, VFTS 174, VFTS 176, VFTS 197, VFTS 538, VFTS 652



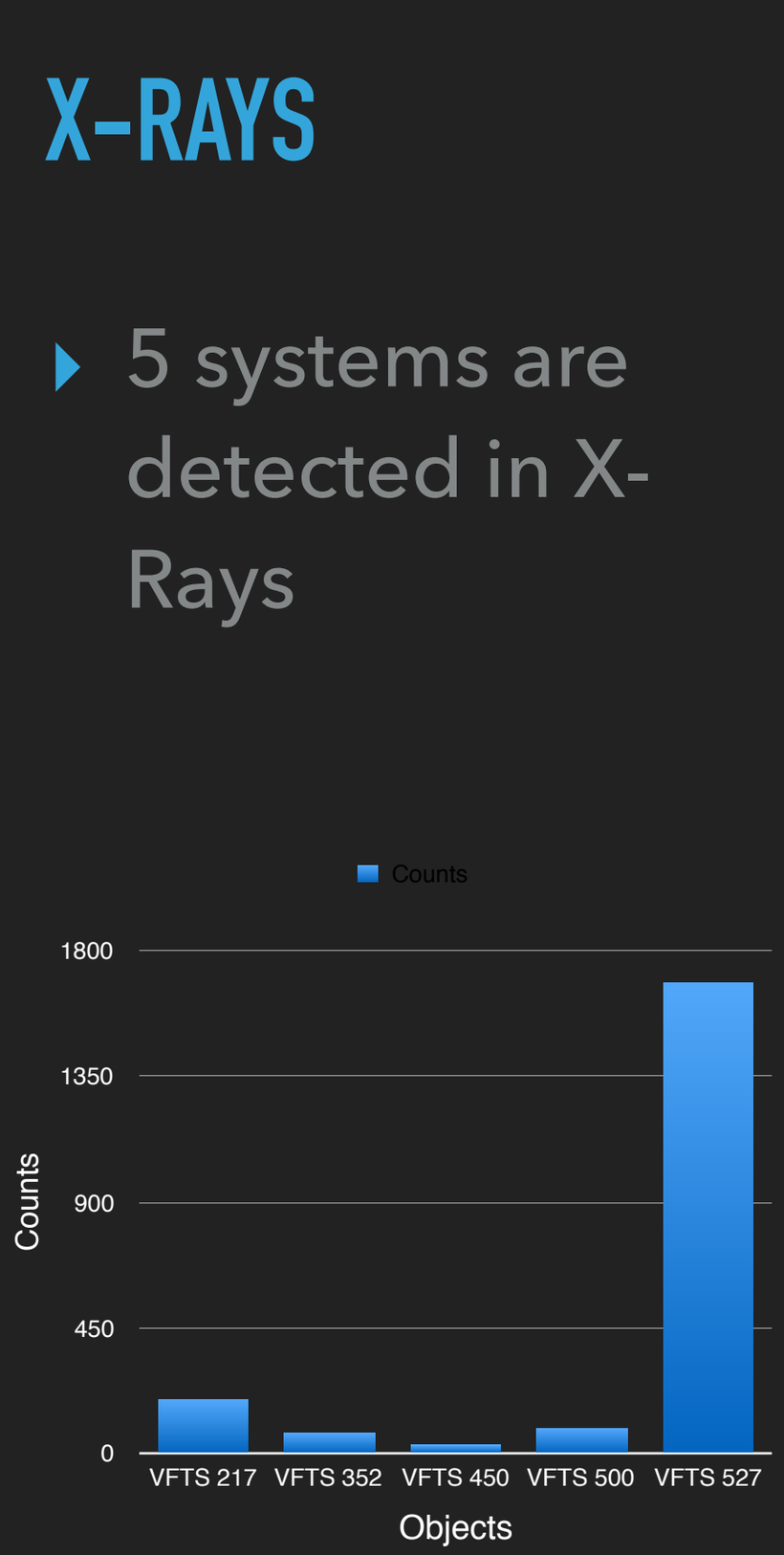
SYNCHRONISATION

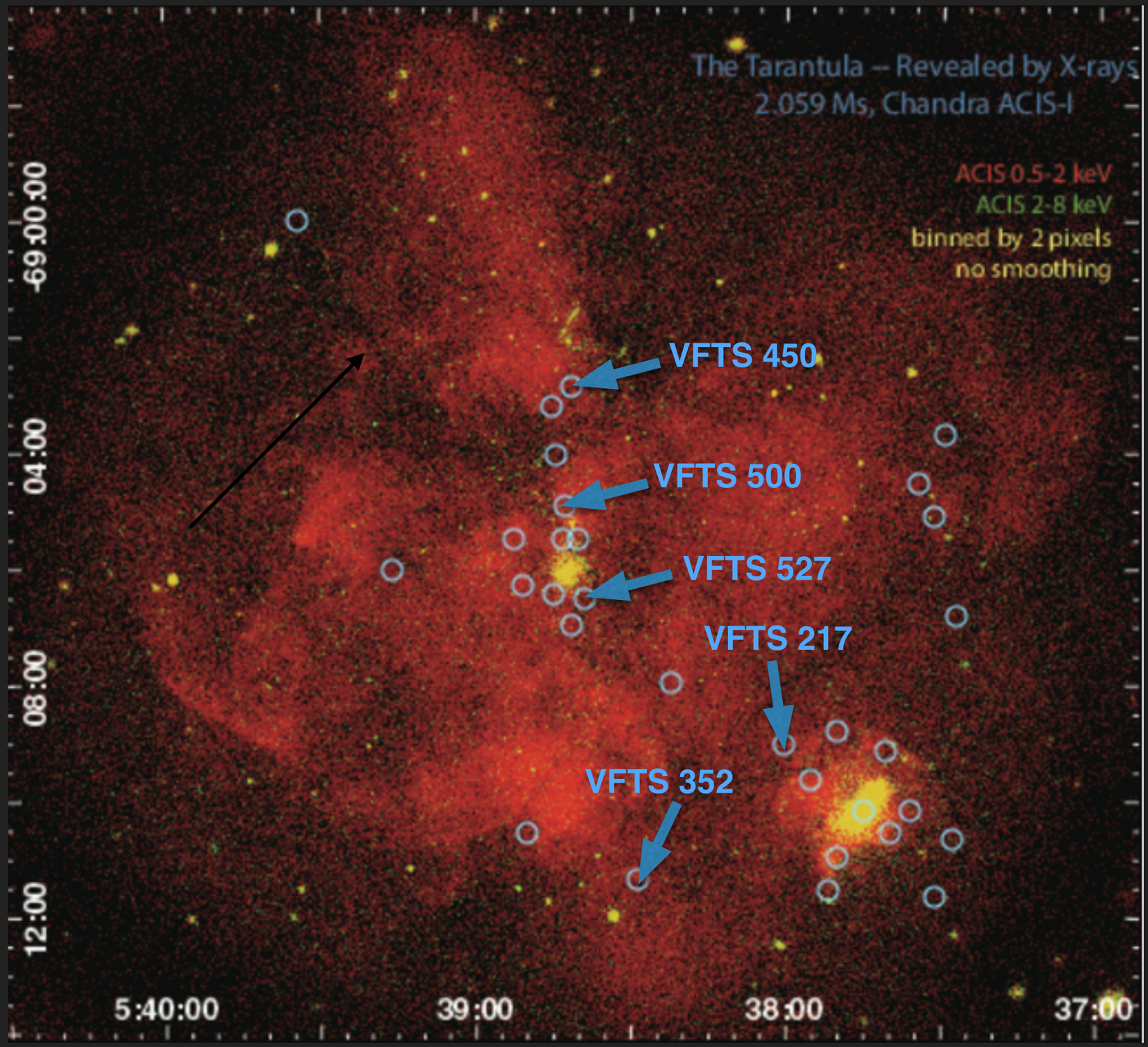
- Two outliers here as well: VFTS 538, VFTS 652



X-RAYS

- 5 systems are detected in X-Rays



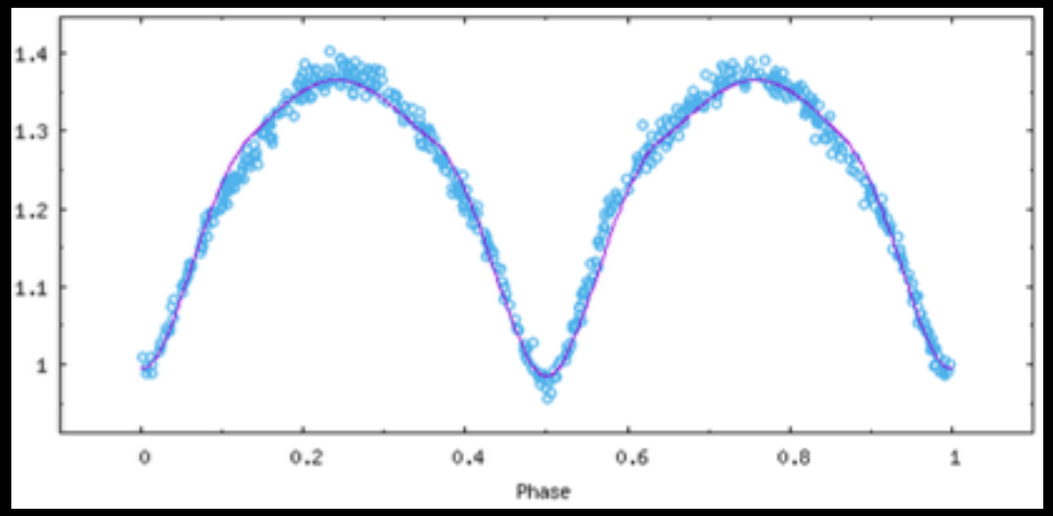


TO DO LIST

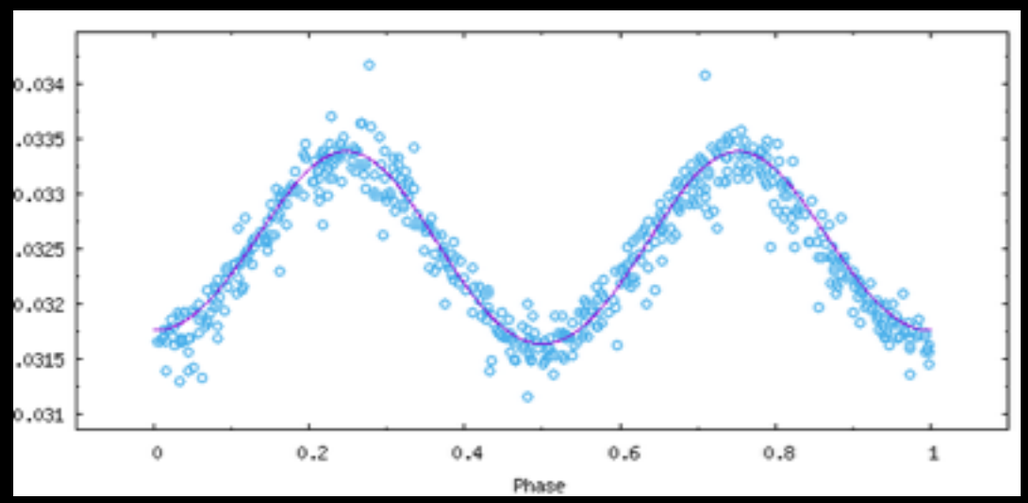
- Finishing the determination of the CN abundances for all the systems
- Comparing the dynamical masses (for photometric systems) to evolutionary and spectroscopic masses and check the mass ratios
- Compare the star formation history of single stars with that of binaries
- Writing the paper...

THANK YOU. . .

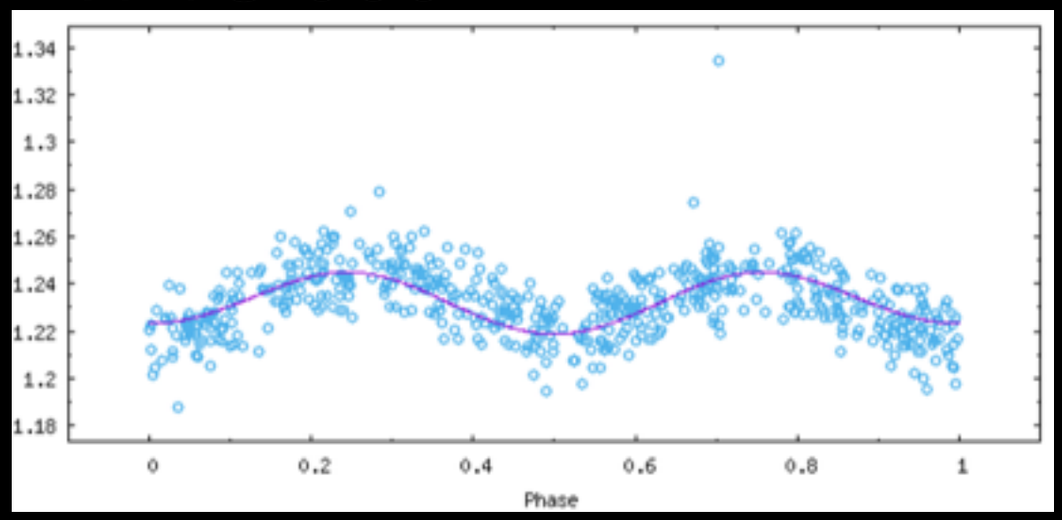
VFTS061



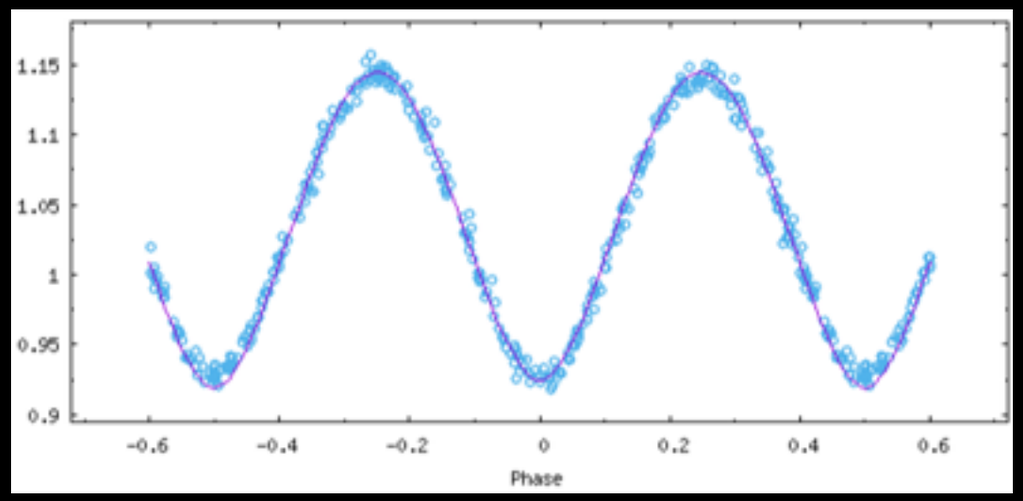
VFTS217



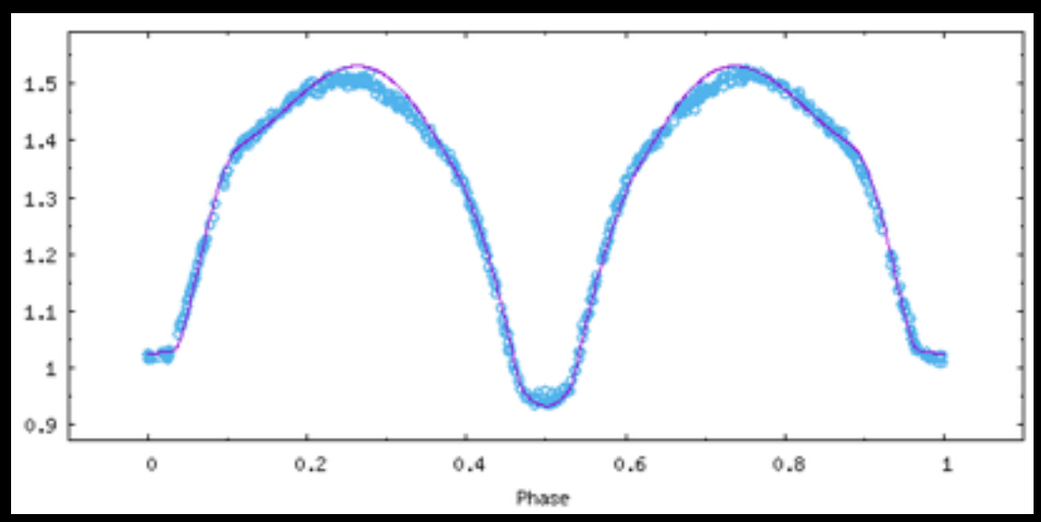
VFTS 066



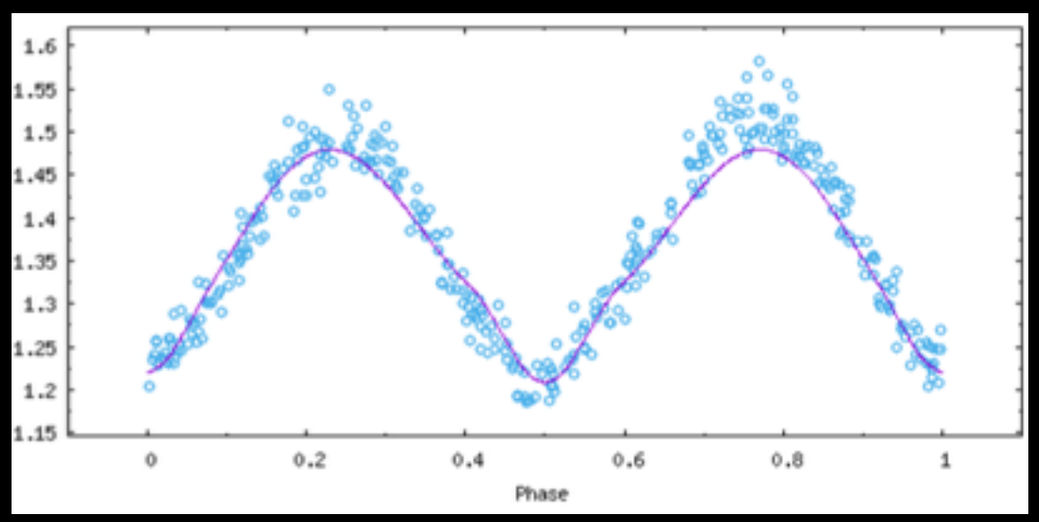
VFTS 352



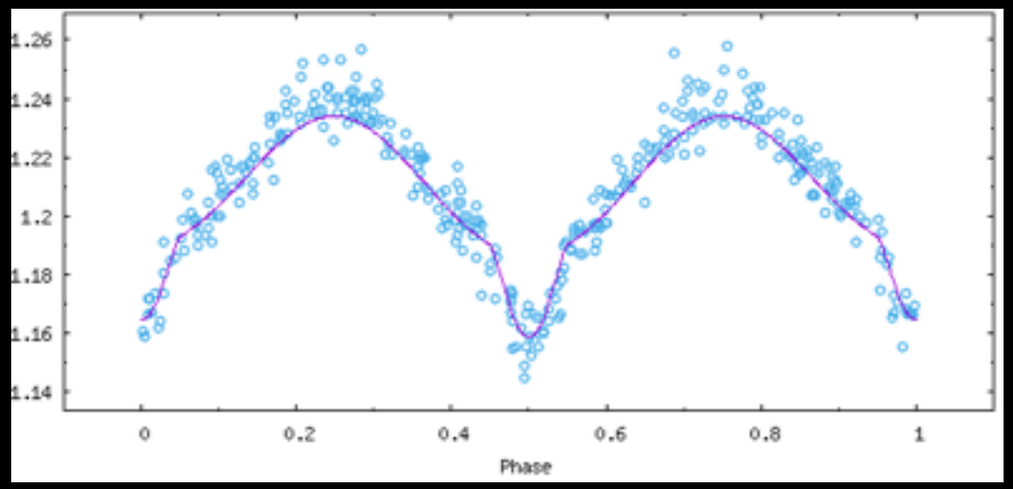
VFTS176



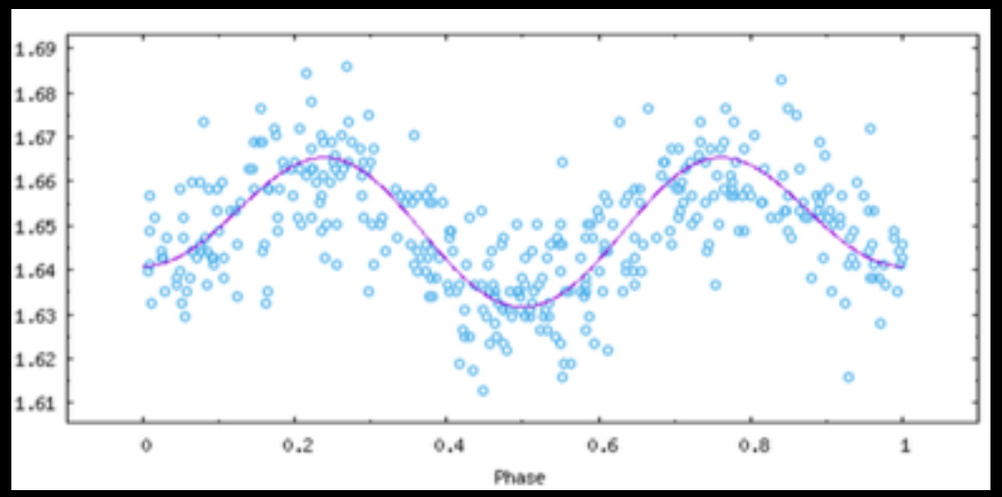
VFTS 450



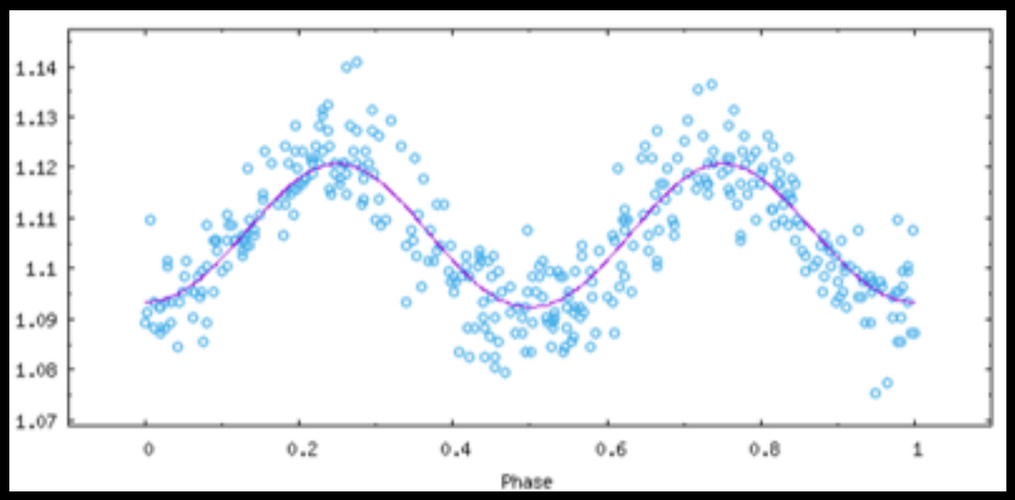
VFTS 500



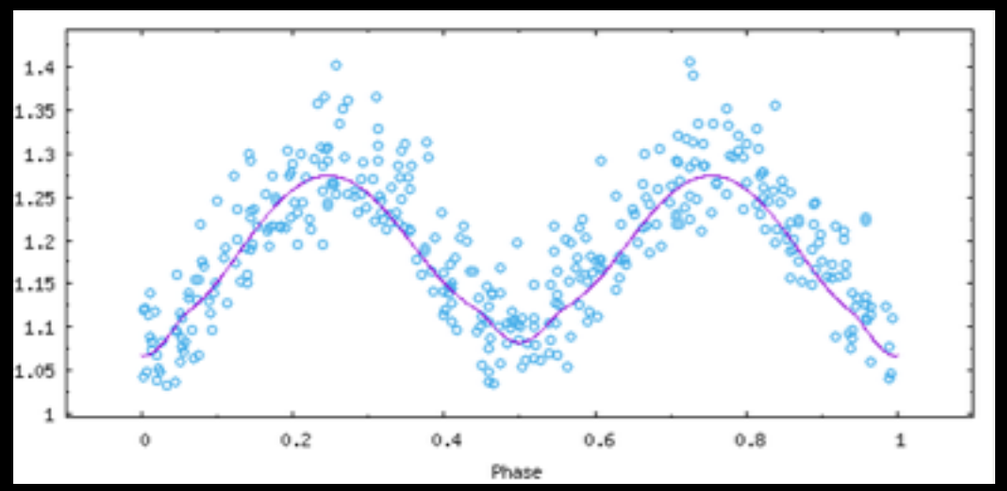
VFTS 642



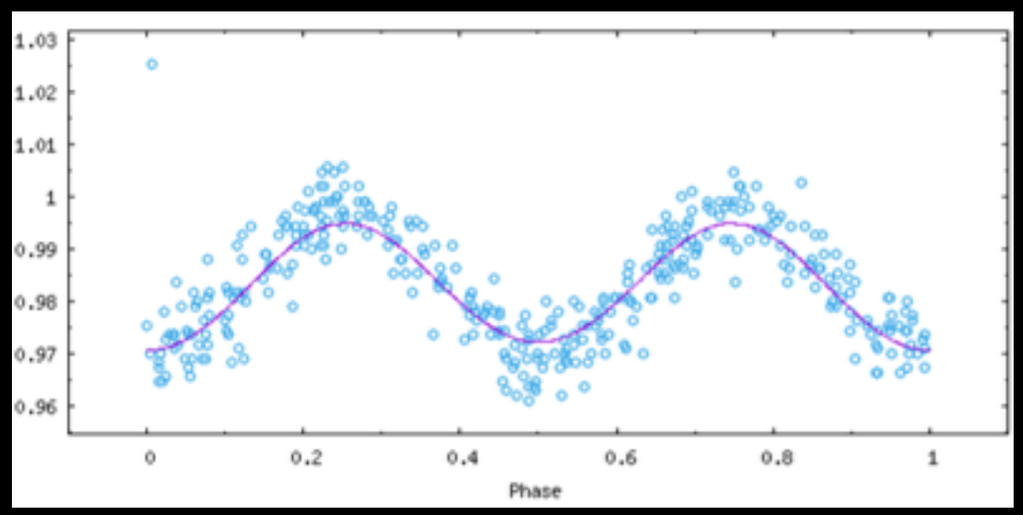
VFTS 543



VFTS 652



VFTS 563



VFTS 661