SALT spectroscopy of HADS stars: reductions and first results

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SALT proposals

2012-1-POL-007:

(Andrzej Pigulski, Zbigniew Kołaczkowski, Grzegorz Kopacki)

Asteroseismology of high-amplitude δ Scuti stars

Allocated: 83.025 s, Observed: 89.010 s (107 per cent)

2012-1-POL-011:

(Ewa Zahajkiewicz, Andrzej Pigulski)

FR Scuti: a hierarchical triple VV Cephei-type system of particular interest
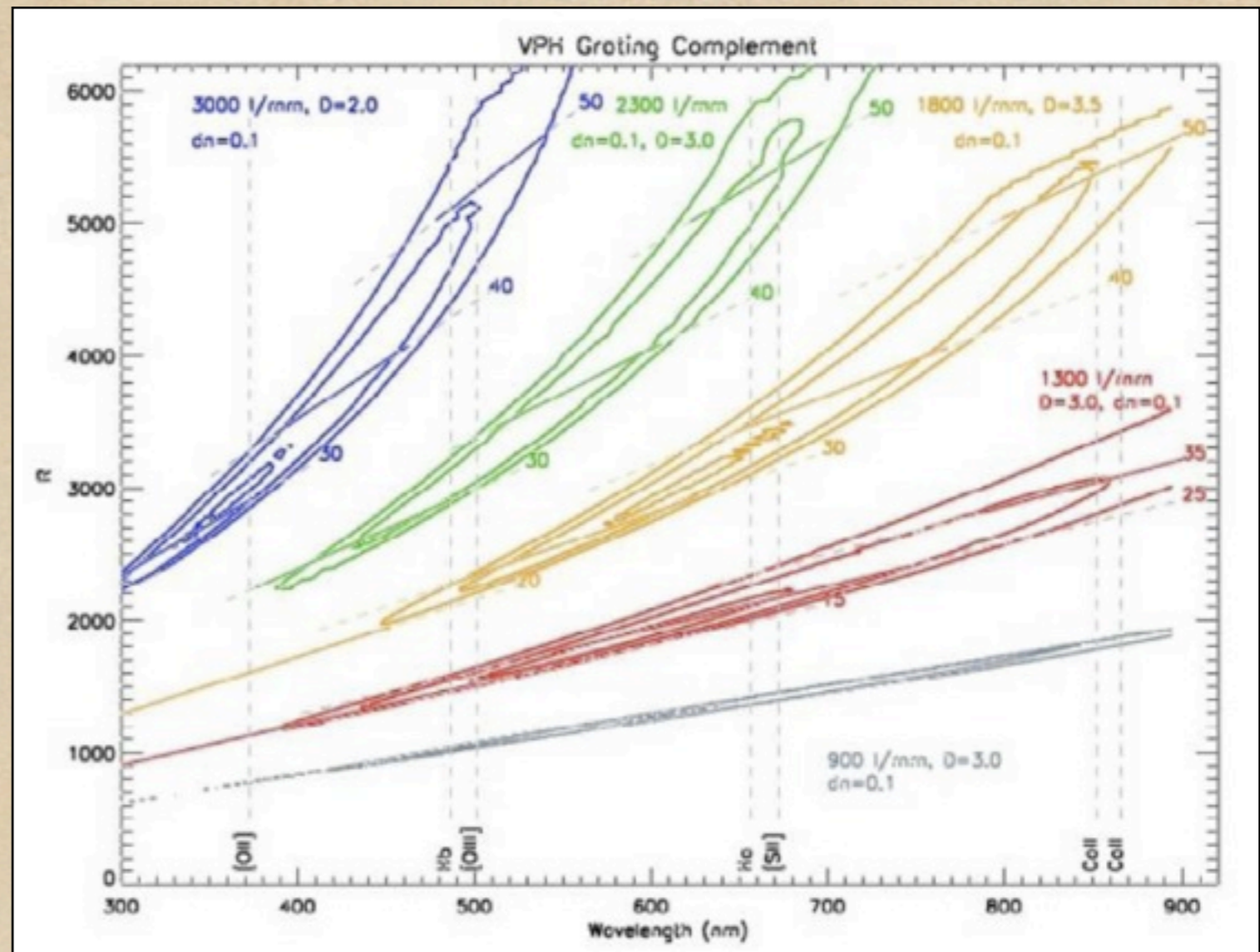
Allocated: 48.000 s, Observed: 13.212 s (28 per cent)

May - October 2012

RSS settings

Mode: long slit
Filter: pc00000
Grating: pg3000
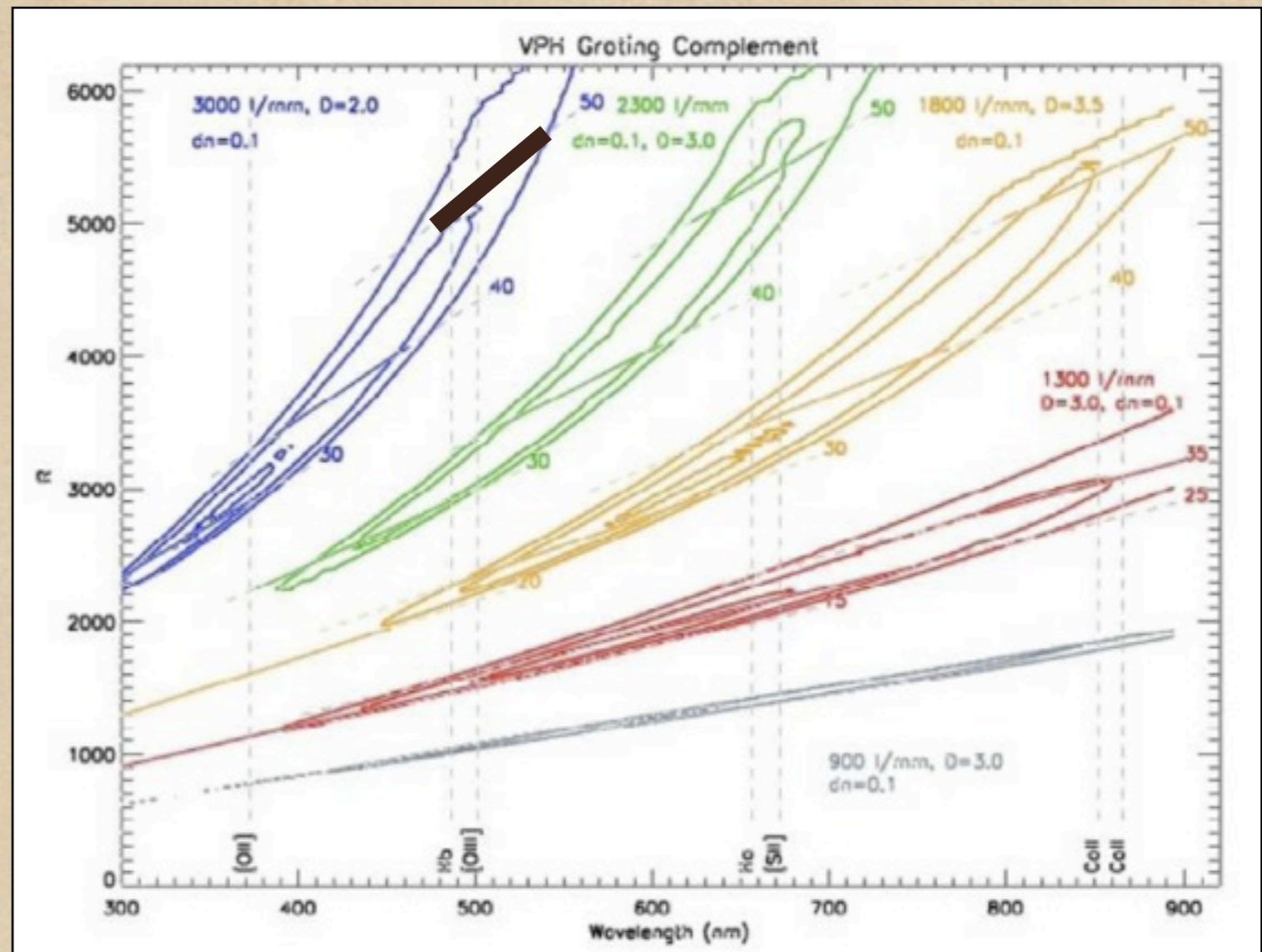Grating angle: 50°
Camera station: 132
Camera angle: 100°

R ~ 5000 - 5500

RSS settings

Mode: long slit
Filter: pc00000
Grating: pg3000
Grating angle: 50°
Camera station: 132
Camera angle: 100°

R ~ 5000 - 5500

4750 – 5400 Å

Reductions

1. Preparation of lists of spectra (OBJECT, ARC, FLAT).
   [shell, gawk]
2. Combining FLATs. [PySALT, saltred.saltcombine]
3. Flat-fielding (OBJECTs). [PySALT, saltred.saltflat]
4. Cleaning spectra from CREs (OBJECTs).
   [PySALT, saltred.saltcrclean]
5. Transformation to IRAF format. [PySALT, saltred.salt2iraf]
6. Extraction of spectra (OBJECT).
   [IRAF, noao.imred.specred.apall]
7. Same for ARCs [IRAF, noao.imred.specred.apall]
8. Determination of transformation to λ (starting solution
   calculated with [IRAF, noao.imred.specred.identify]).
   [IRAF, noao.imred.specred.reidentify]. (best r.m.s. 0.05 px)
9. Transformation to λ. [IRAF, noao.imred.specred.dispcor]
10. Normalization. [IRAF, noao.imred.specred.continuum
   & .sarith]
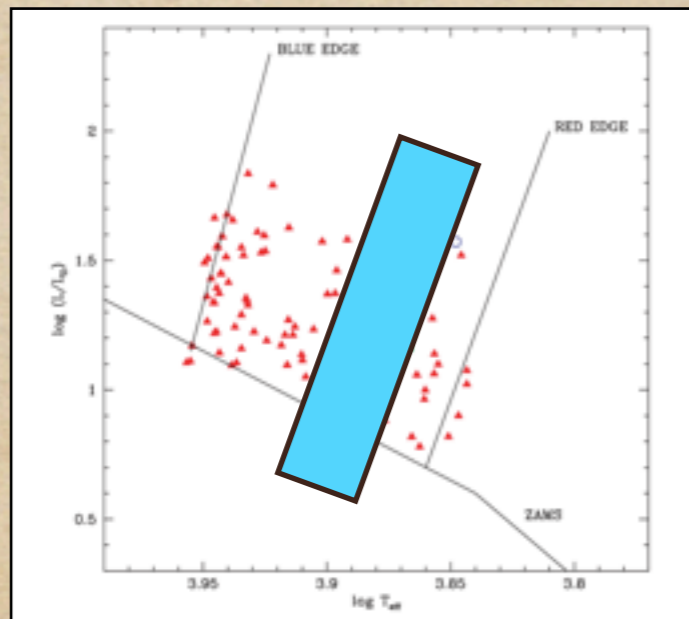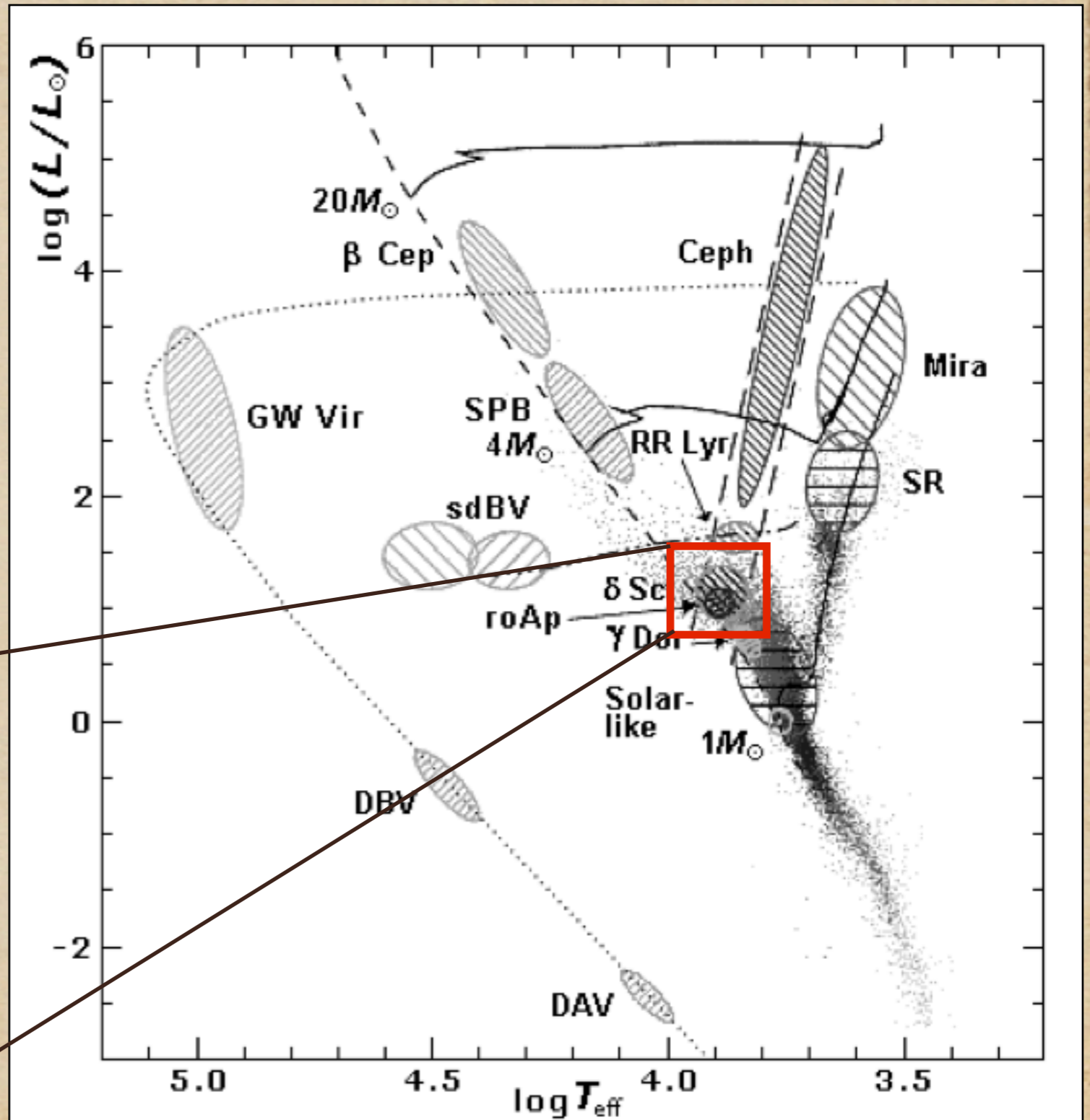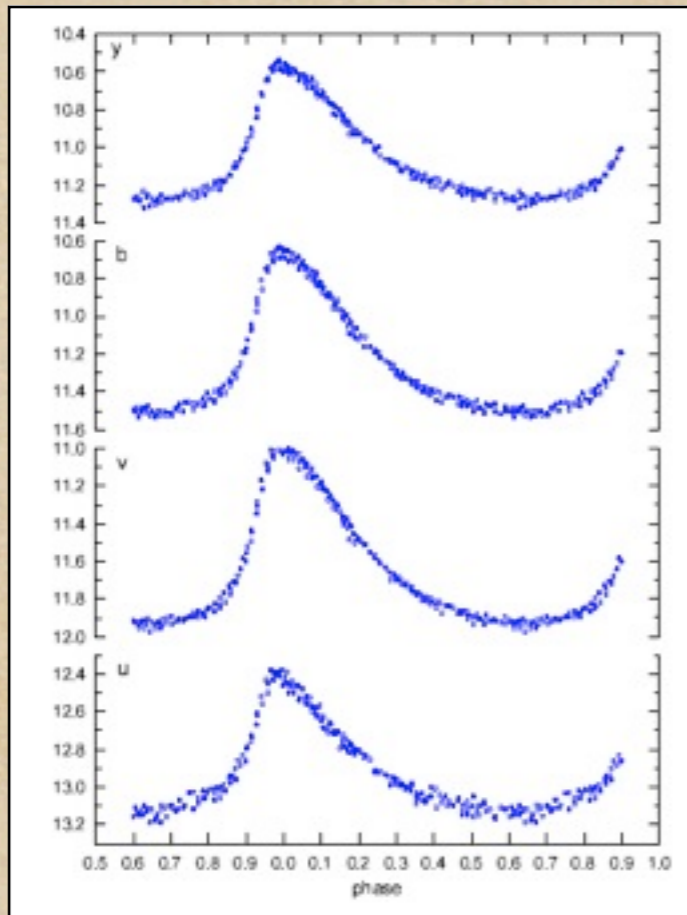
HADS stars (dwarf Cepheids)
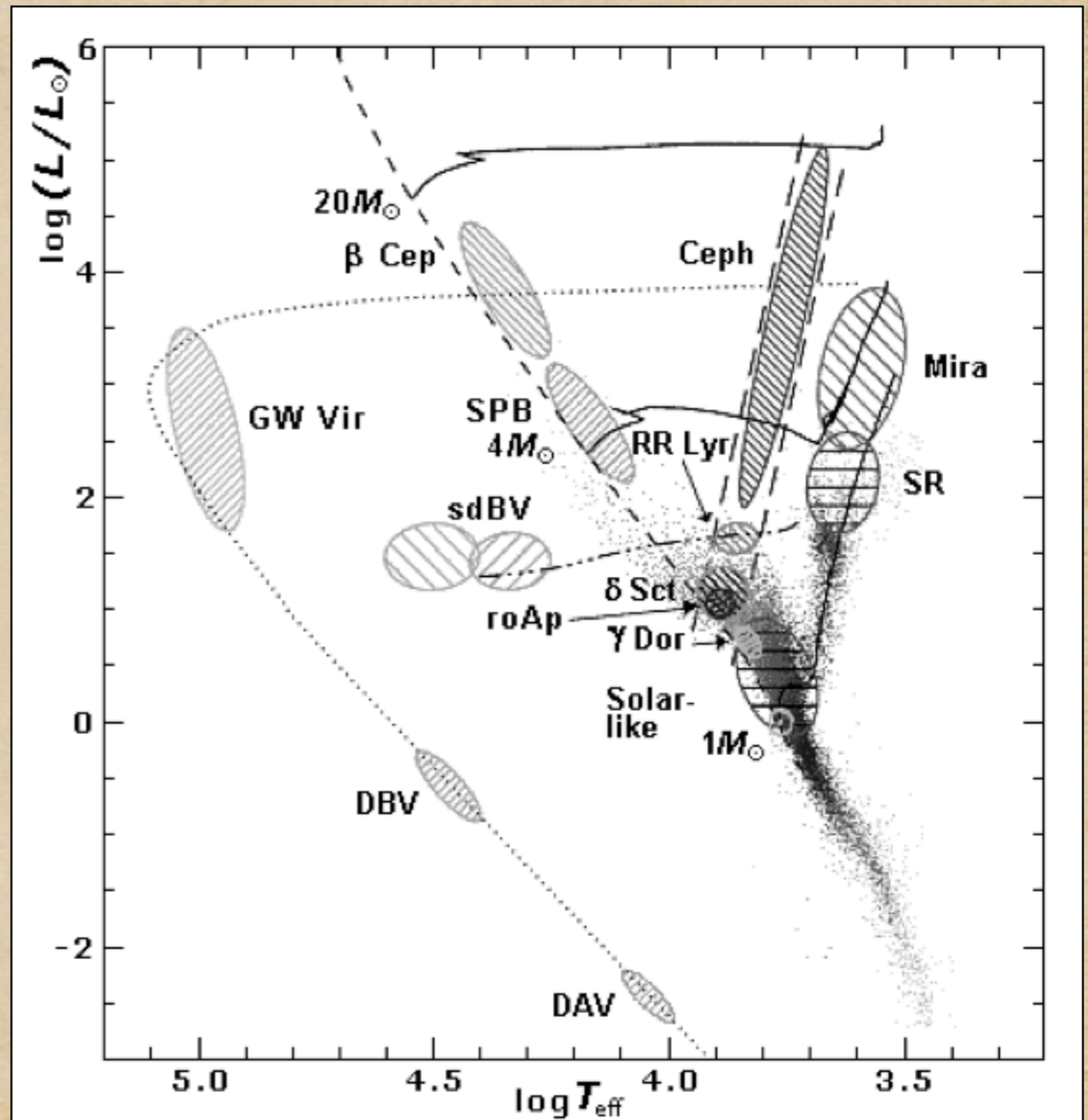
HADS stars (dwarf Cepheids)
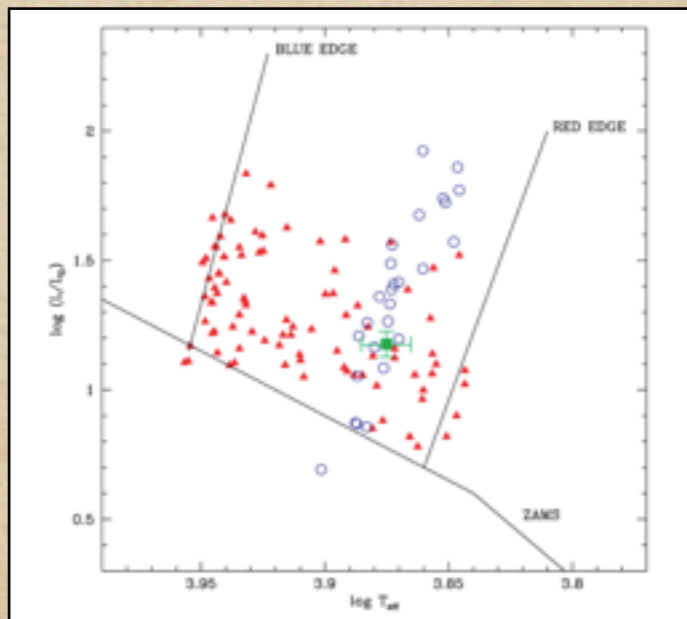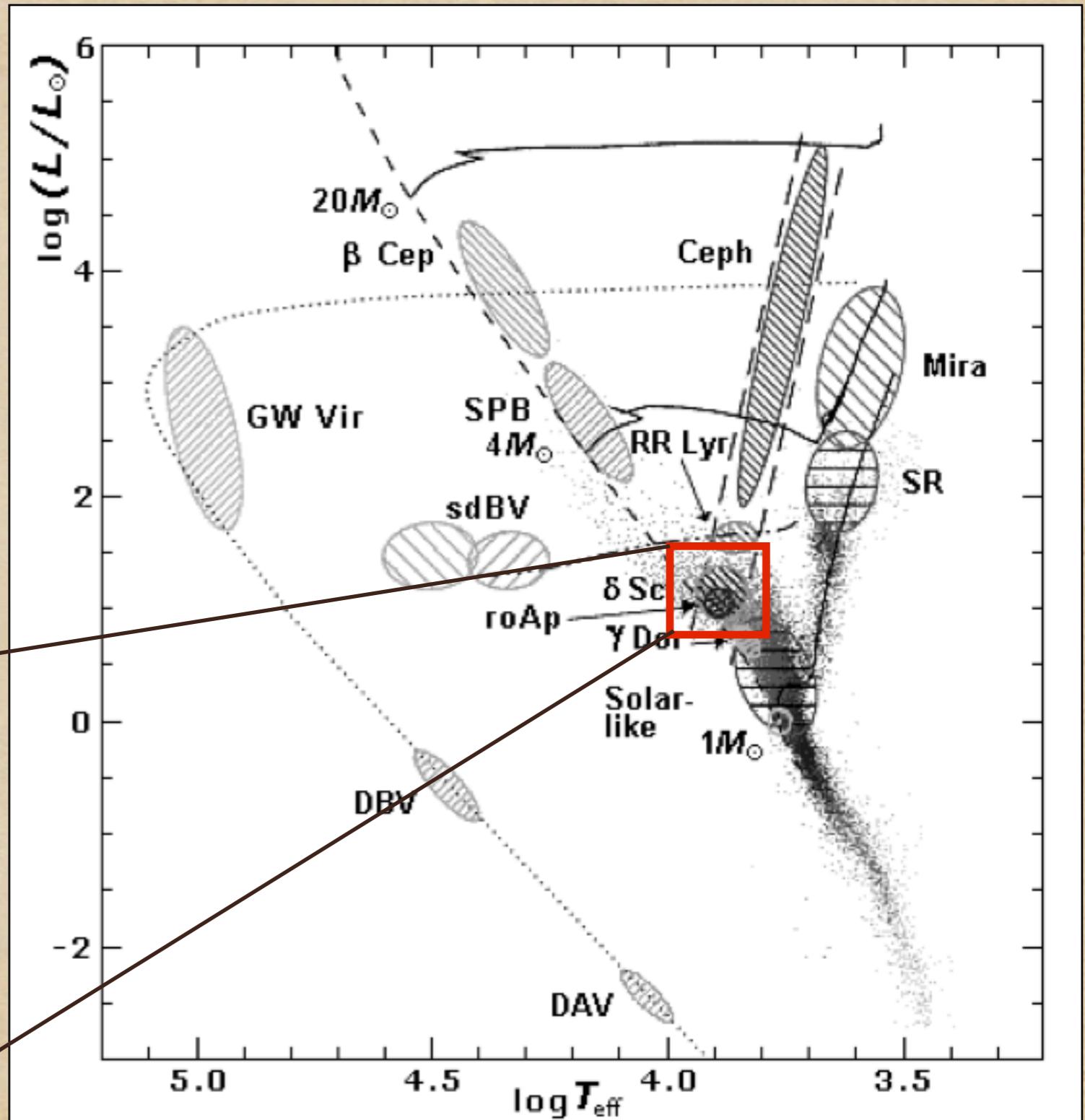
Christiansen et al. (2007)
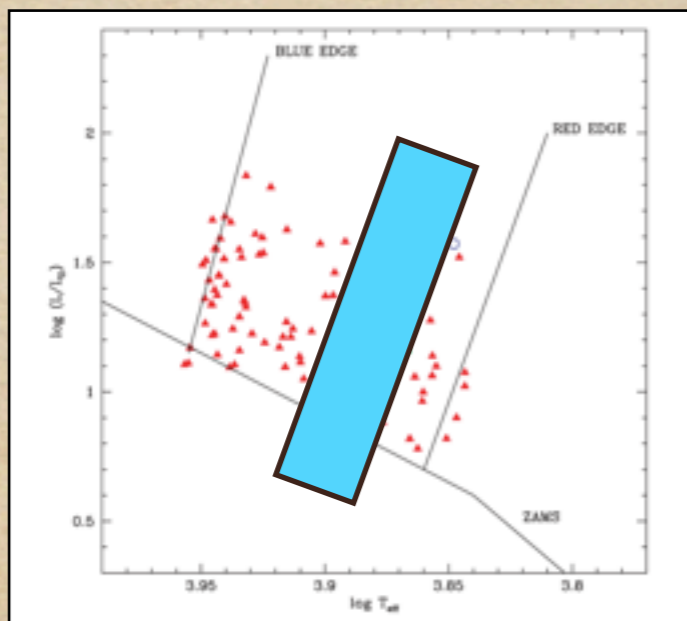
HADS stars (dwarf Cepheids)
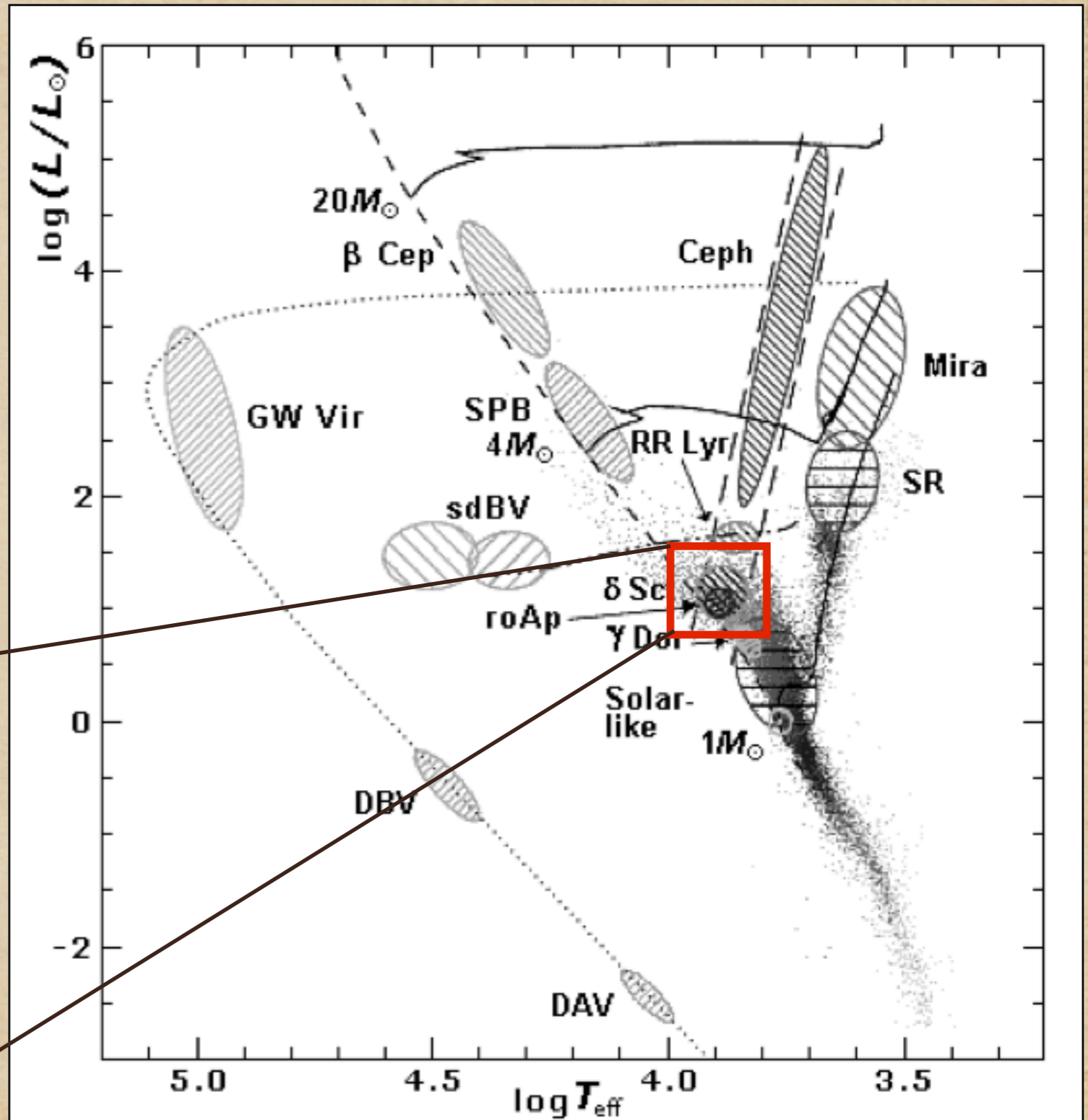

Christiansen et al. (2007)
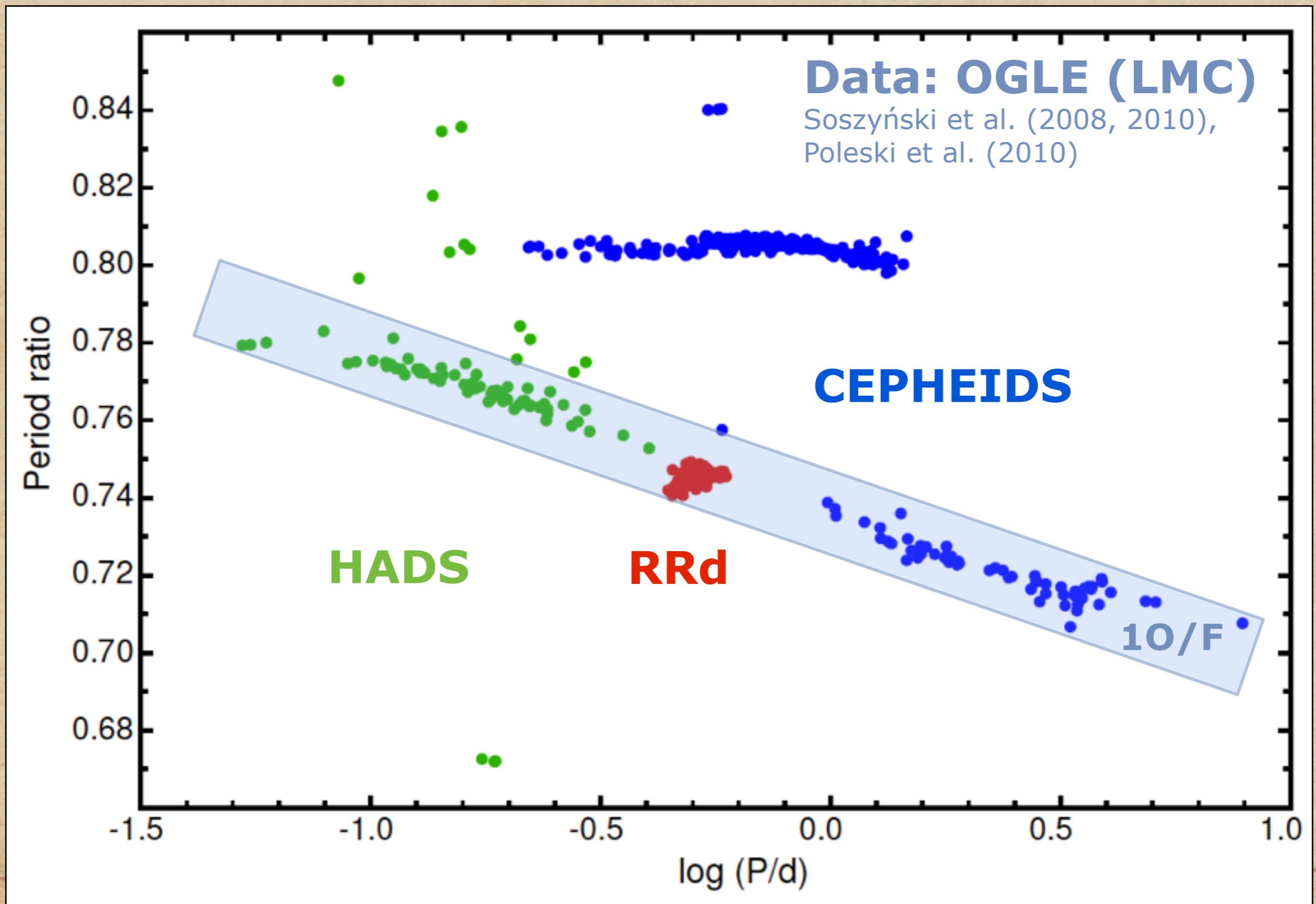
HADS stars (dwarf Cepheids)
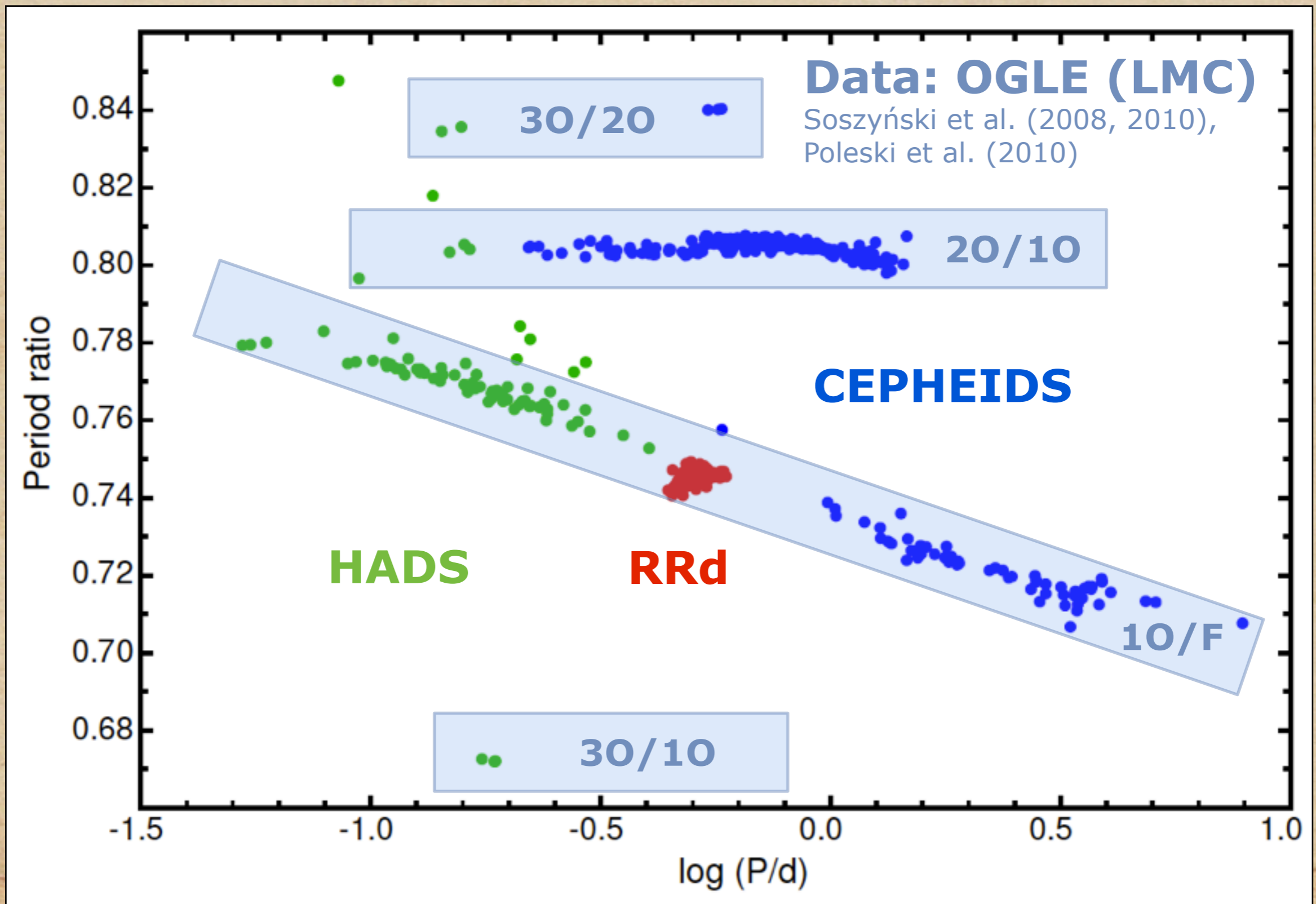
Sterken et al. (2012)

Christiansen et al. (2007)
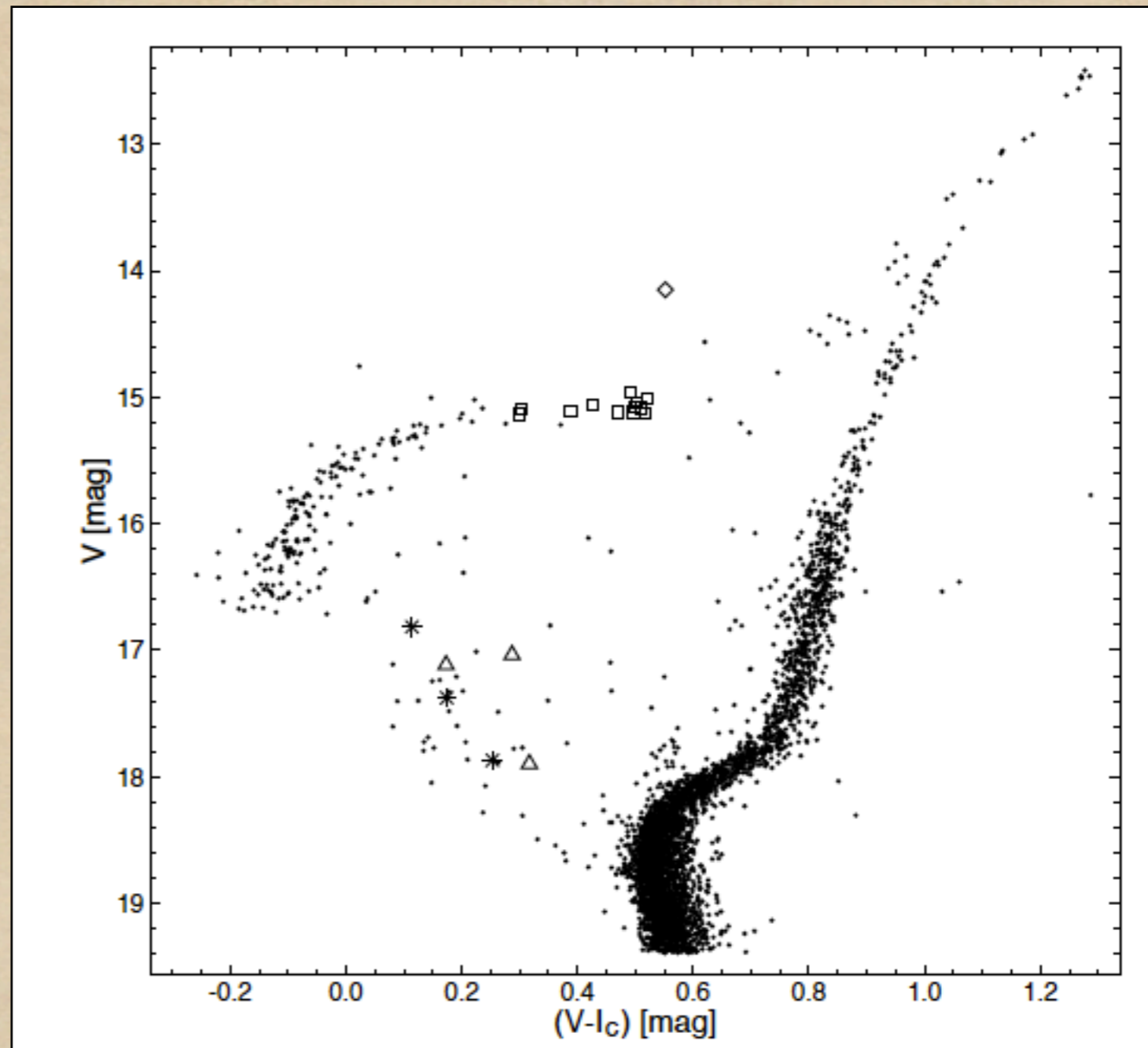
HADS stars: Petersen diagram

HADS stars: Petersen diagram

SX Phe stars

HADS stars:
main-sequence (MS)
or
early post-MS stars

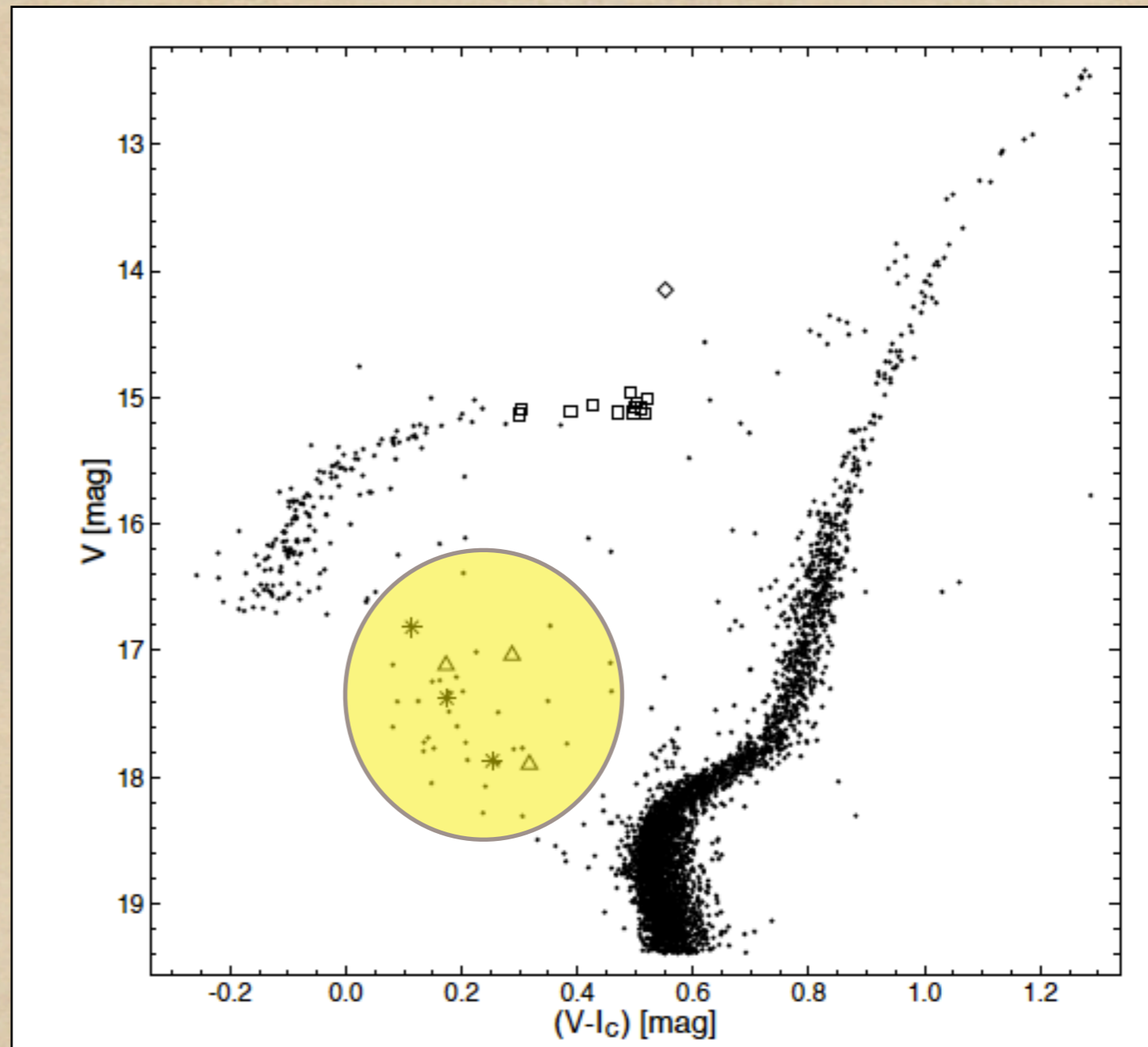## SX Phe stars:
blue stragglers
(mergers),
metal-poor

Kopacki (2007, AcA 57, 49)
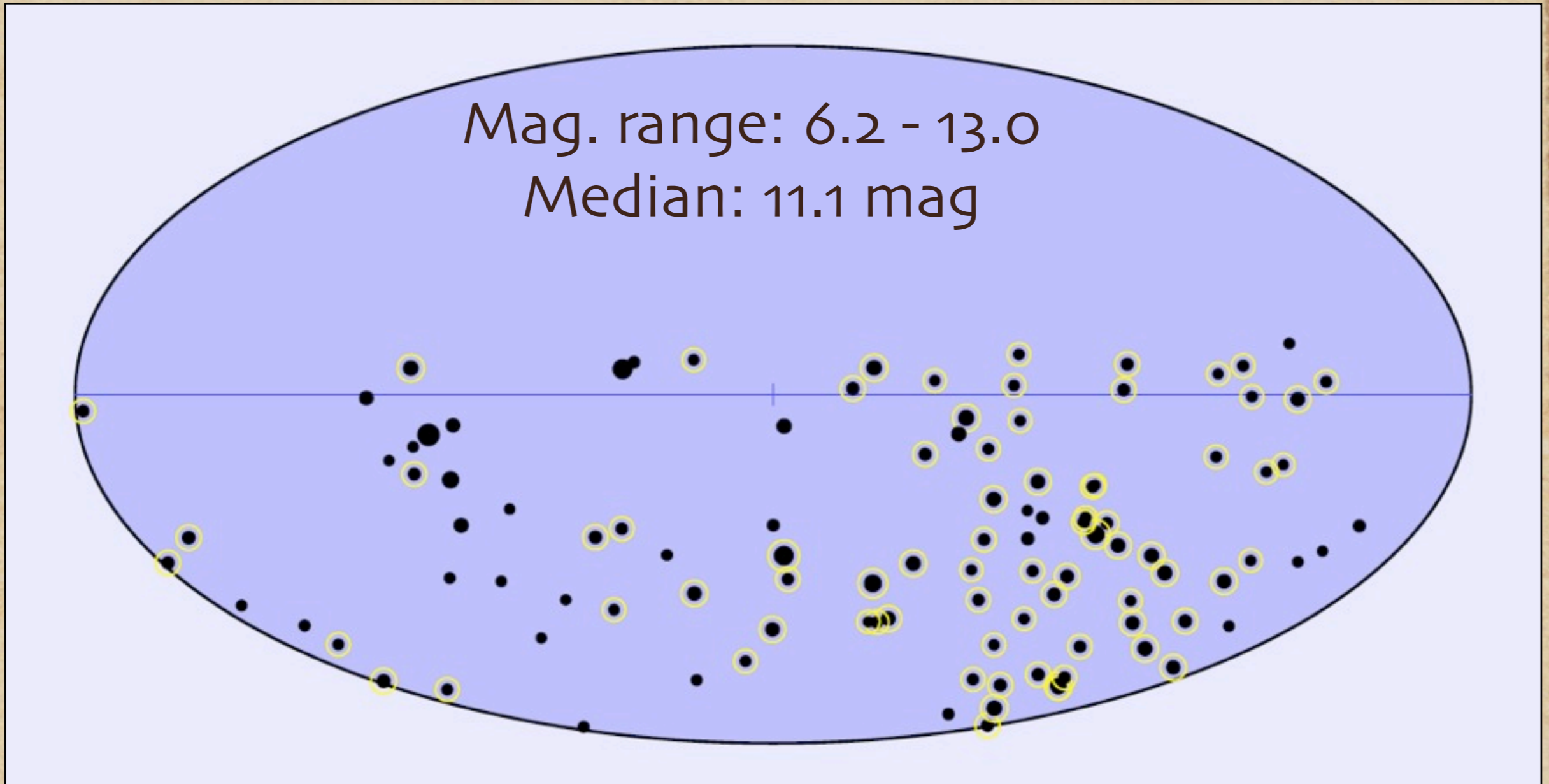
SX Phe stars

HADS stars:
main-sequence (MS)
or
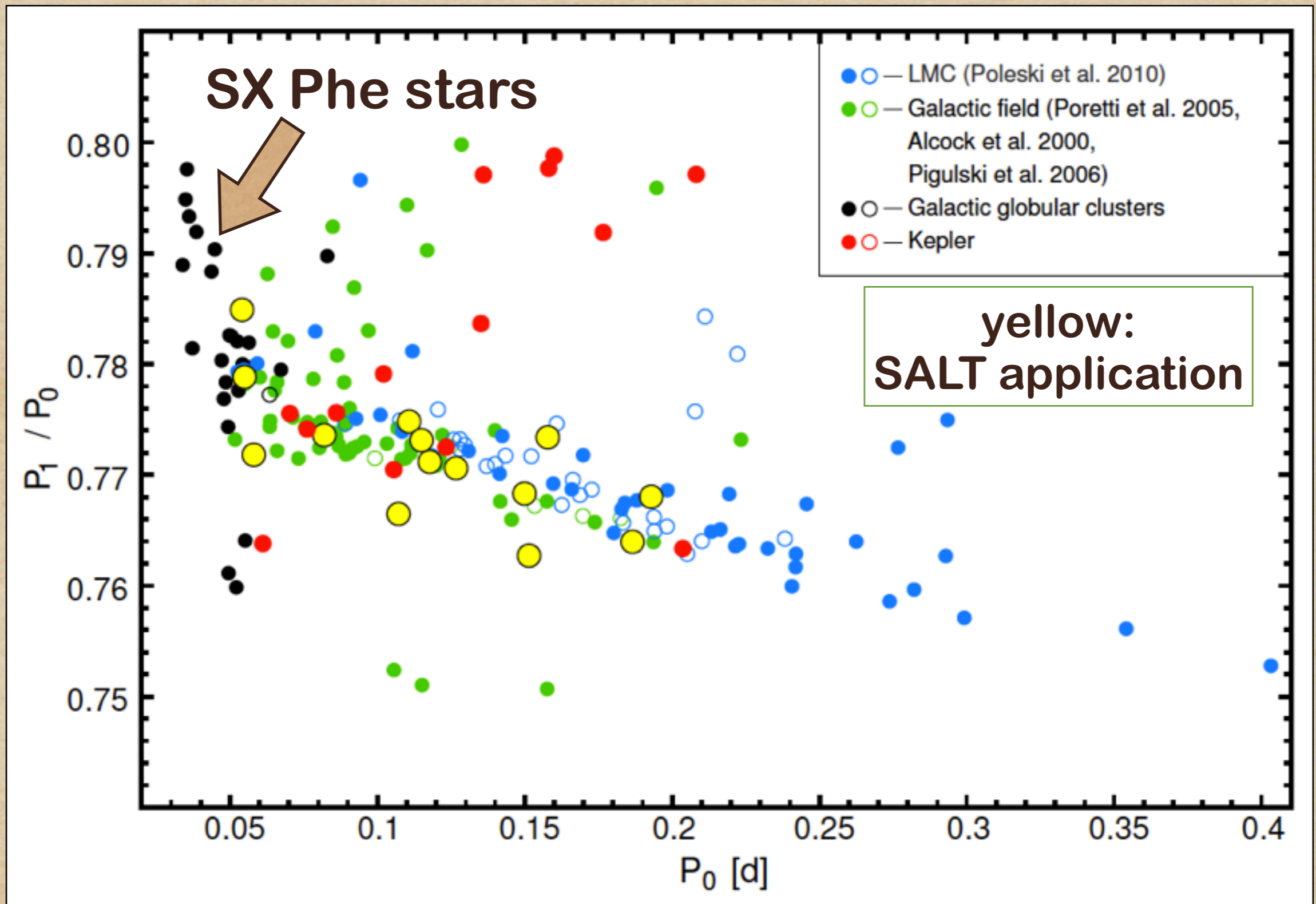early post-MS stars

SX Phe stars:
blue stragglers
(mergers),
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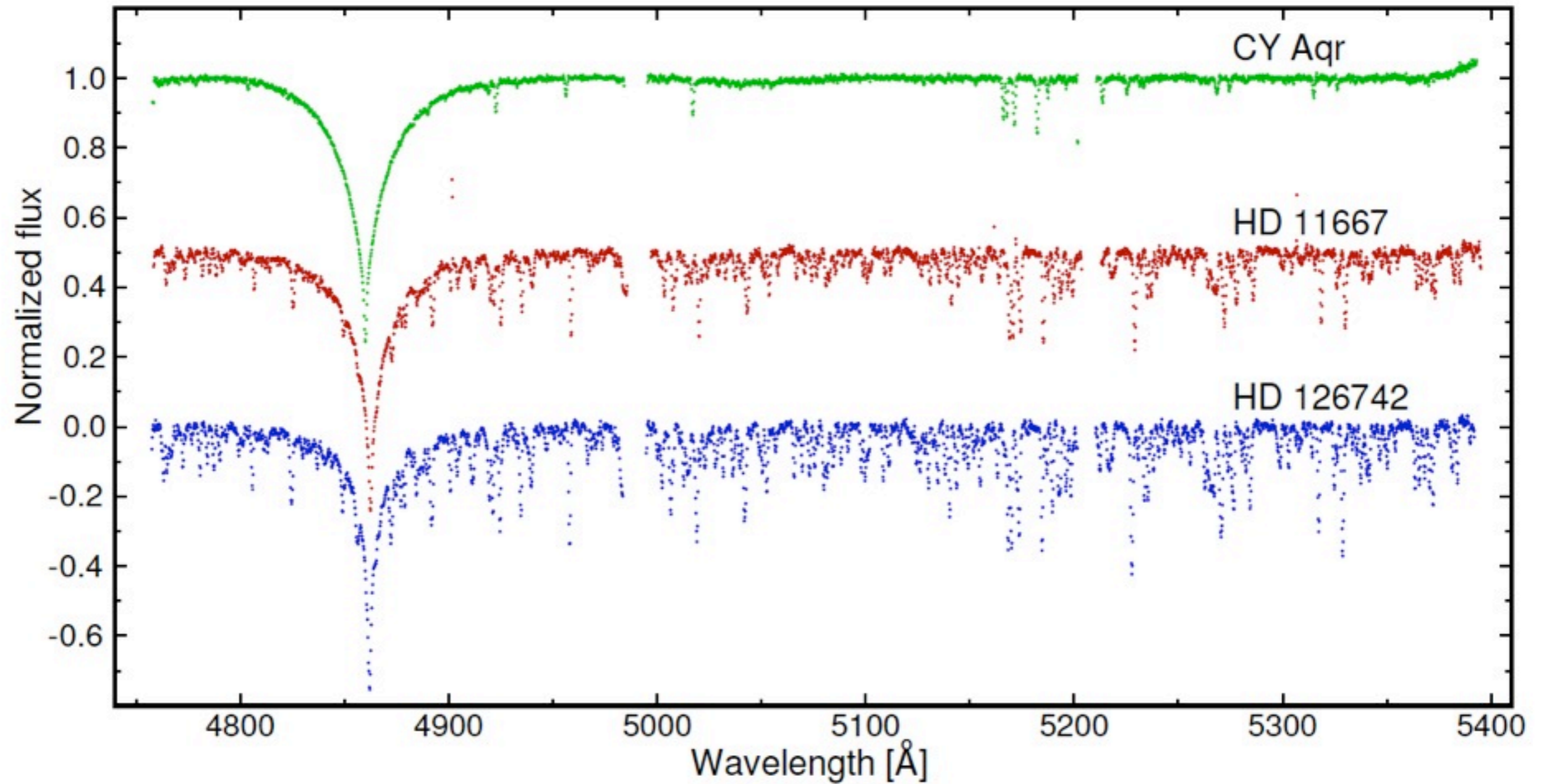

Kopacki (2007, AcA 57, 49)

Observed sample

Mag. range: 6.2 – 13.0
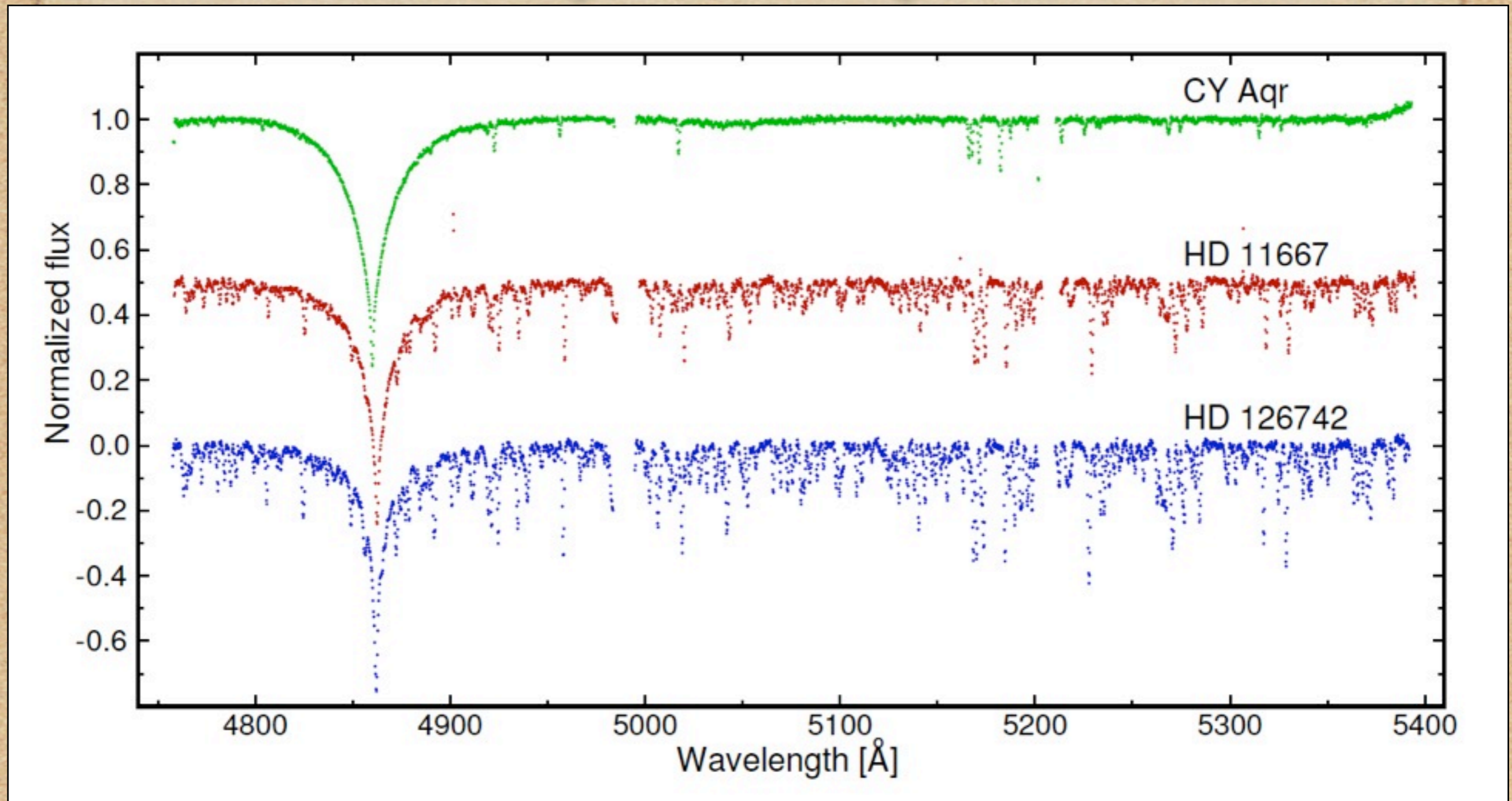Median: 11.1 mag

107 stars in the pool
78 observed

HADS stars: Petersen diagram

Sample SALT spectra

Sample SALT spectra

S/N: ~90 up to ~350, median ~150

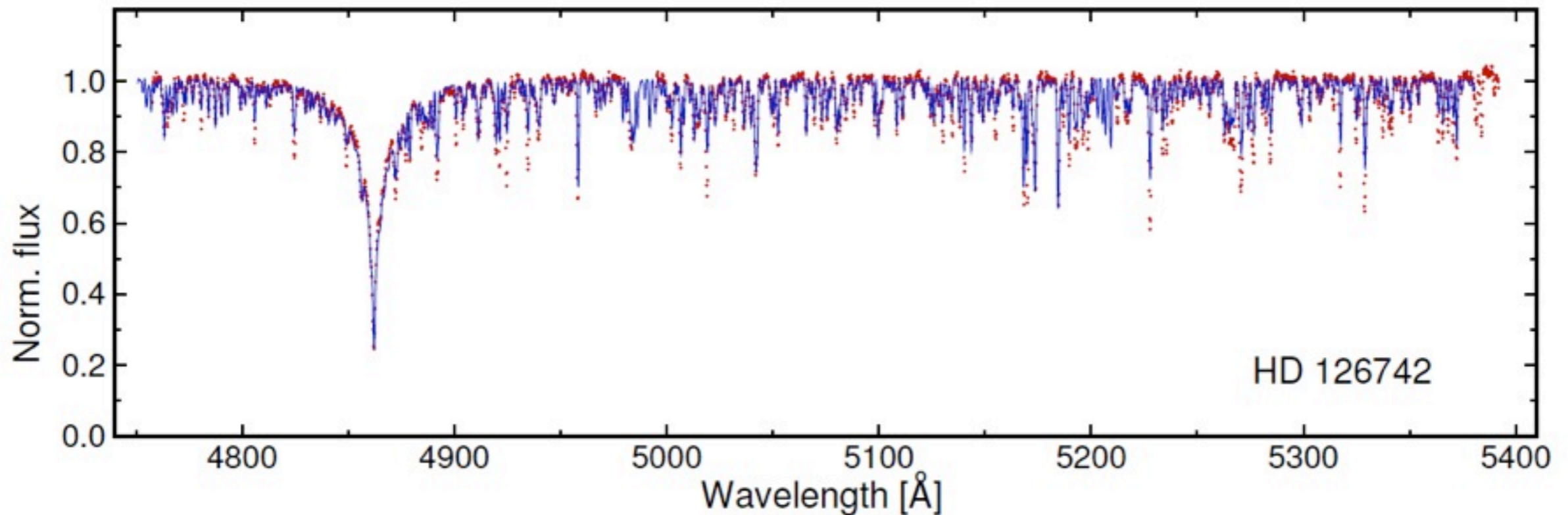# Fitting spectra

Parameters to derive:

- T_{eff}
- log g
- [Fe/H]
- V sin i
- V_{rad}

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Fitting spectra

Parameters to derive:
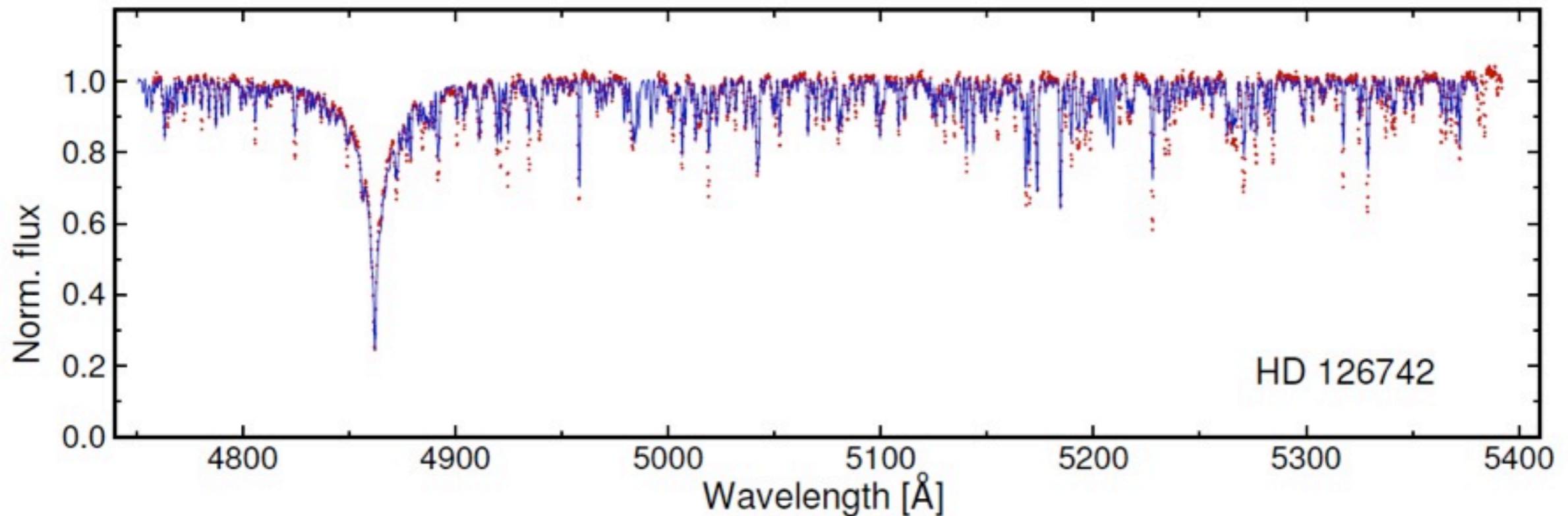- T_{eff}
- log g
- [Fe/H]
- V sin i
- V_{rad}

HD 126742:
T_{eff} = 7000 K
log g = 4.0
[Fe/H] = 0.0
V sin i = 35 km/s
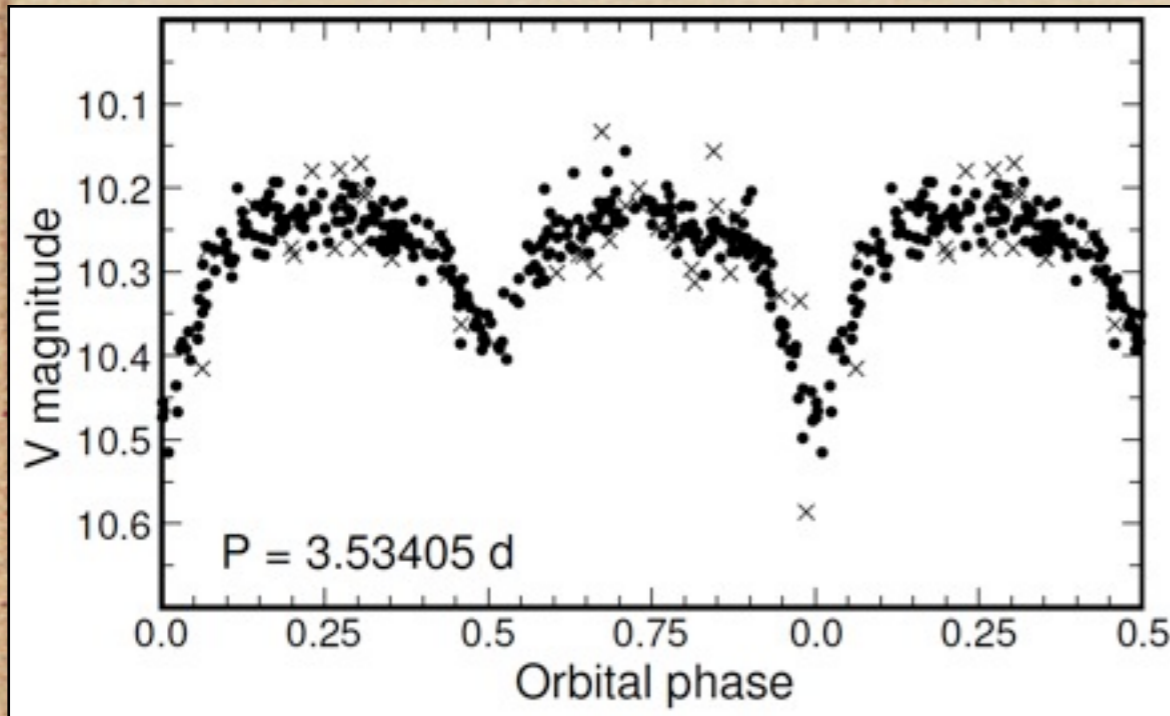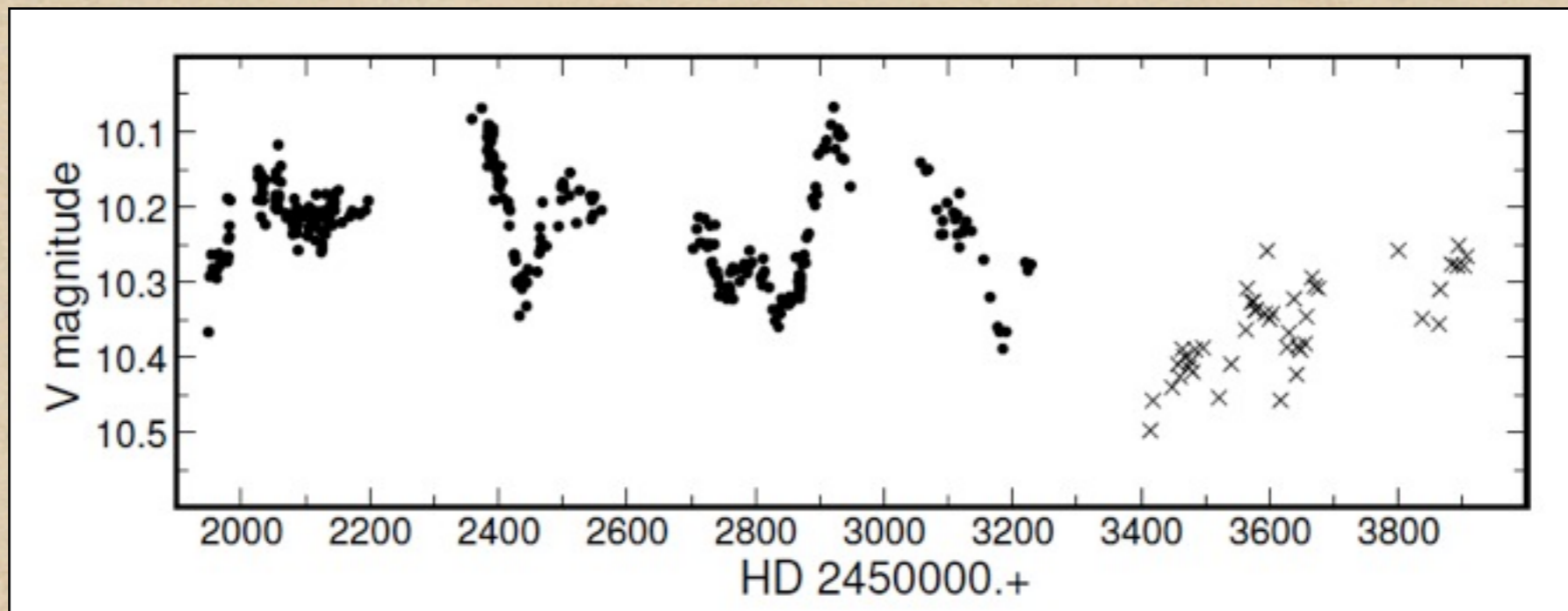V_{rad} = +45 km/s

Conclusions

HADS stars:

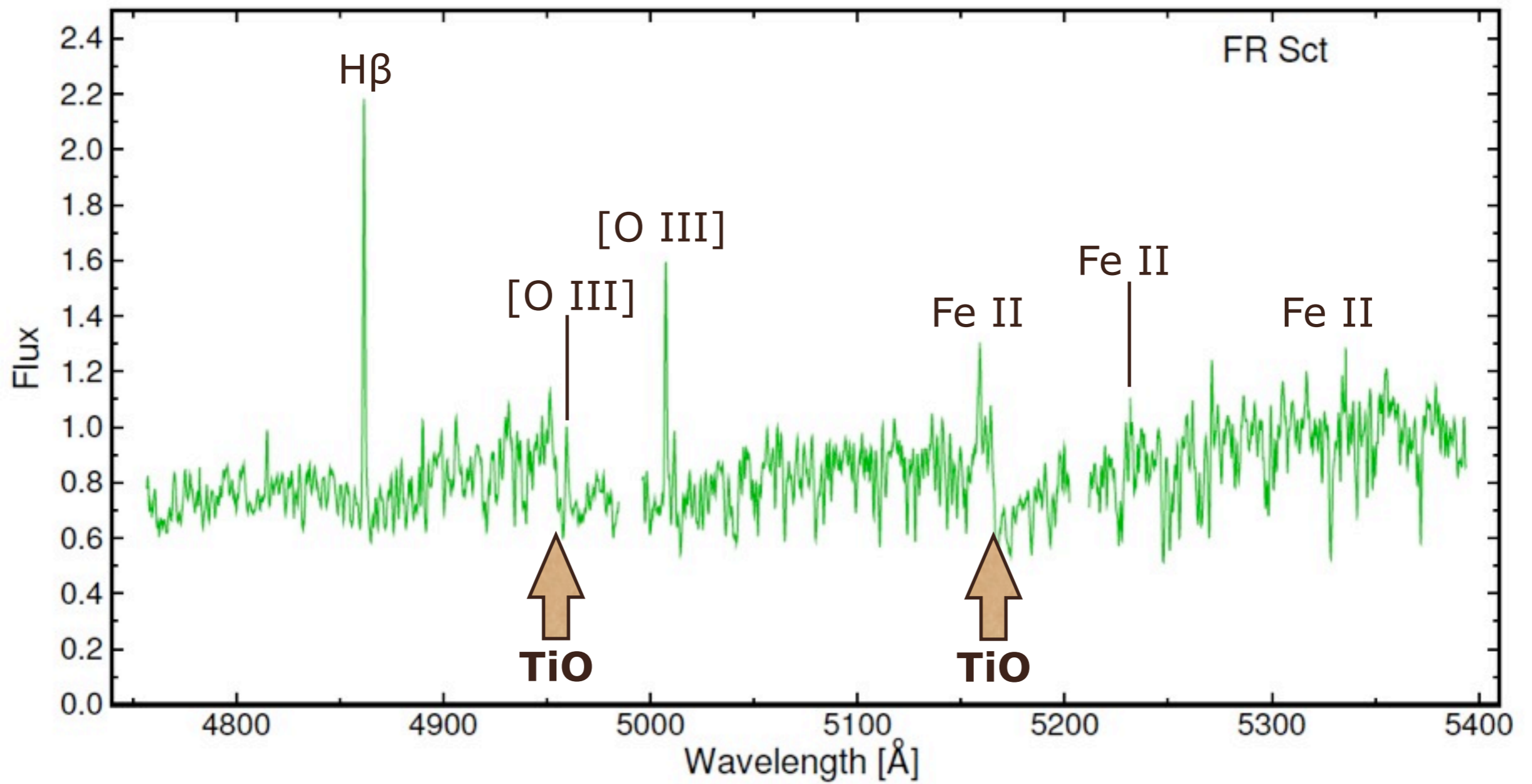We will achieve the goals of the project.

Draft paper: in 2-3 months.

FR Sct

Atypical VV Cep-type triple star:

eclipsing pair (O/B + O/B) + M-type supergiant

Pigulski & Michalska (2008)

FR Scuti

Conclusions

FR Sct:

We will try to separate spectra of hot stars and cool supergiant and , if possible, derive parameters of the close binary.

The solution of the wide orbit would require more spectra spread over the orbital period of the hot pair – M-type supergiant binary.

Problems / questions

1. Arc frames different than requested (Ar, Xe, req. ThAr).
2. Mistakes in headers (wrong frame type).
3. PySALT.saltspec fails.
4. PySALT does not work on 64-bit machines.
5. What is the instrumental profile of the RSS?