O and early B stars in the GES analysed by CMFGEN

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Overview

- Multiplicity among GES massive stars
- Method to determine the parameters
- Results
- Conclusion

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Multiplicity among GES massive stars

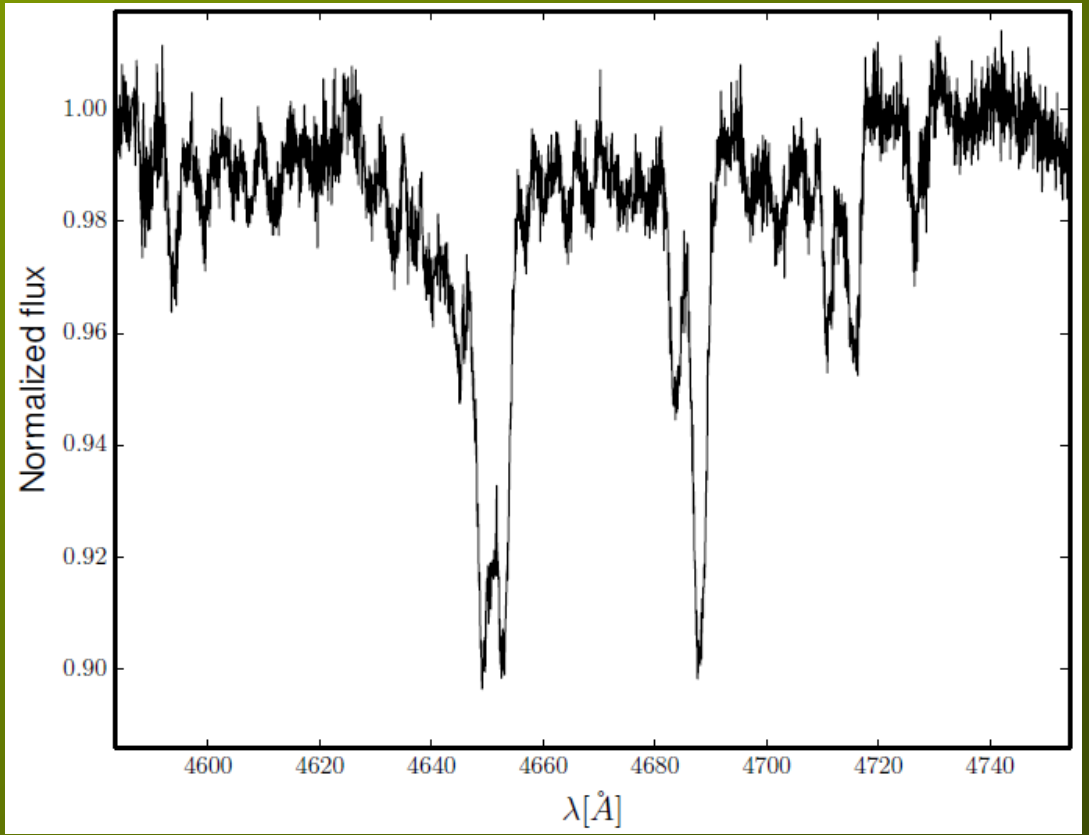
- O and early B stars = 20 objects
  from B1.5V → O3.5III(f*)

- For present analysis :
  we focus on B0V → O3.5III(f*)
  = 16 objects

Multiplicity among GES massive stars

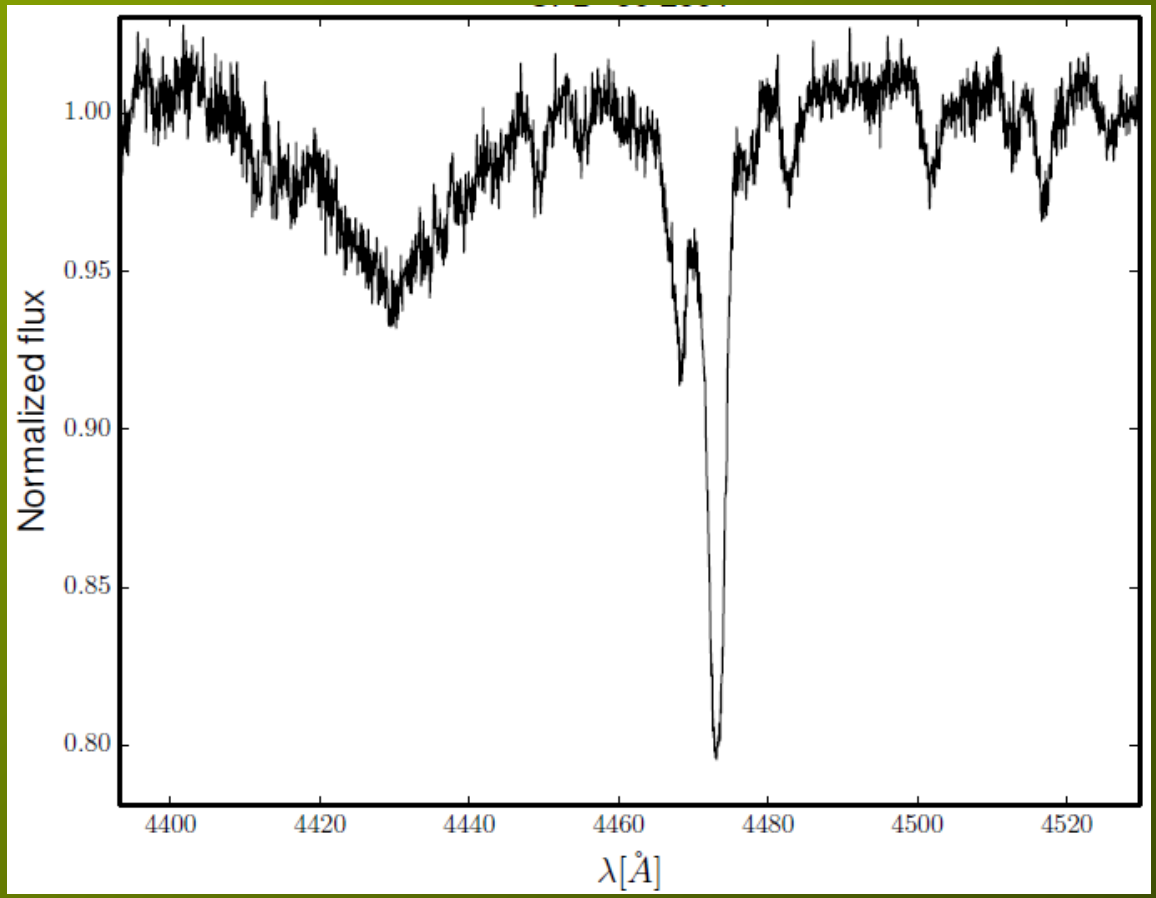
- Among these stars, there are obviously some binaries :
  - CPD -58 2649 :

Clear SB2 signature in Carbon and Helium lines



Multiplicity among GES massive stars

- CPD -59 2591 :



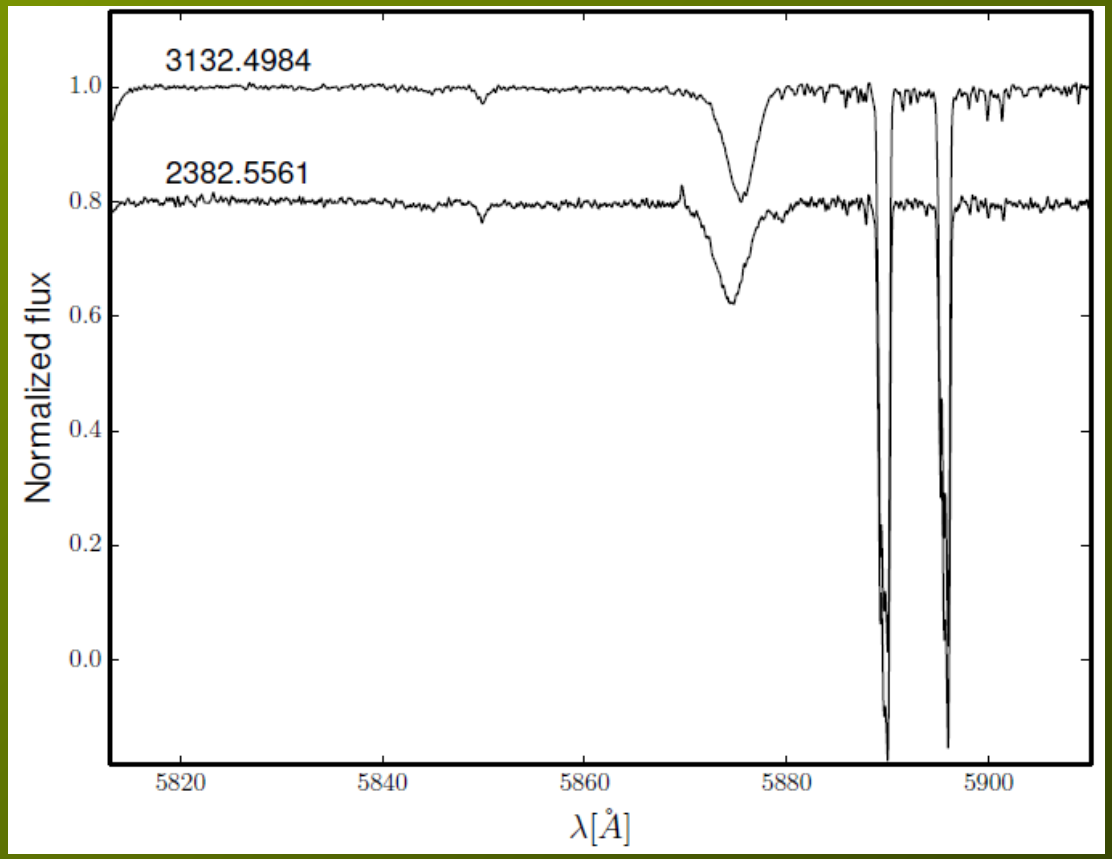
Clear SB2 signature in at least Nitrogen and Helium lines

Multiplicity among GES massive stars

- HD93161B :

  Already mentioned as showing variations by Nazé et al. (2005)

  We retrieved 2 FEROS spectra at two different epochs :



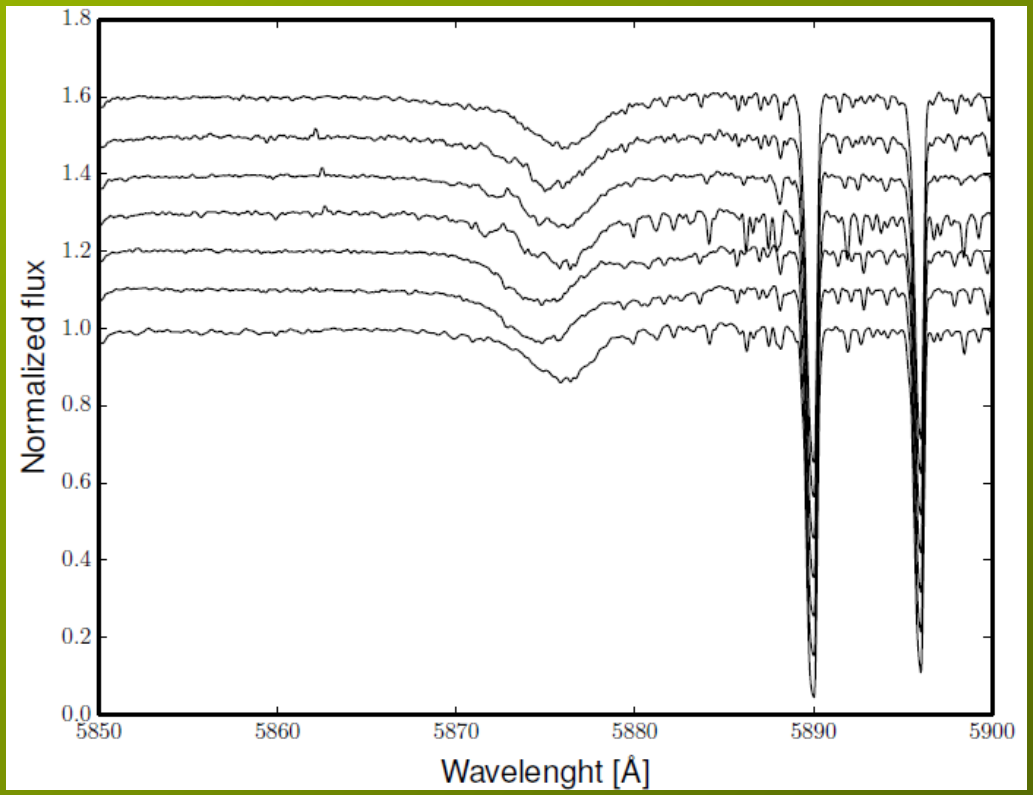
Clear SB2 signature in the Helium lines

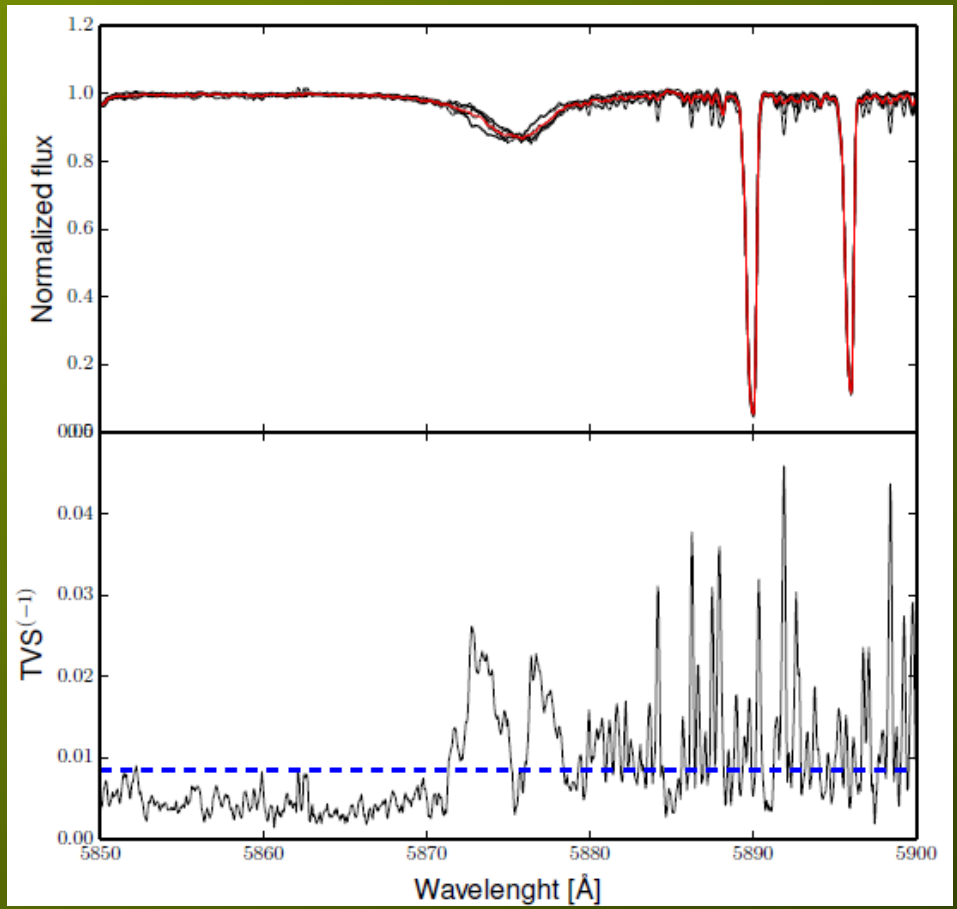
Multiplicity among GES massive stars

- CPD -59 2600 :

  Reported as SB1 (and maybe SB2) by Sota et al. (2014)

  We retrieved several FEROS data :





Multiplicity among GES massive stars

- From 16 objects, 4 are clearly binary systems (~25%)
  we removed them from the analysis

- The others are considered as presumably single stars but we must be careful because for almost all these objects, only one spectrum has been taken

We could miss some binaries in this sample

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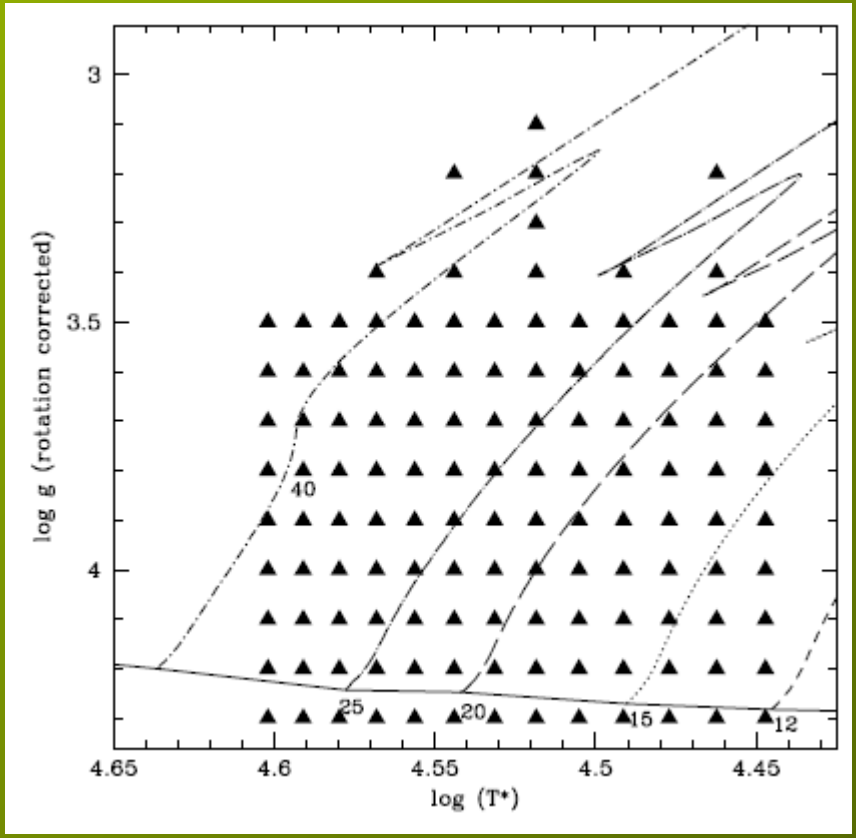
Method to determine the parameters

- Fit by eyes :
  - Teff = ratio between the HeI 4471 and HeII 4542 lines
  - Logg = wings of Balmer lines (only H_δ available in GIRAFFE spectra)
  - N abundance = triplet NIII 4510-15-23
  - C abundance = CIII 4070 line
  - O abundance = OII when available
- Fit to minimize the χ^2 (more automatic procedure)

Method to determine the parameters

- Fit to minimize the χ^2 (more automatic procedure)
- A regular grid has been computed and is still in development:



28000 K ≤ Teff ≤ 40000 K

3.4 ≤ log g ≤ 4.3

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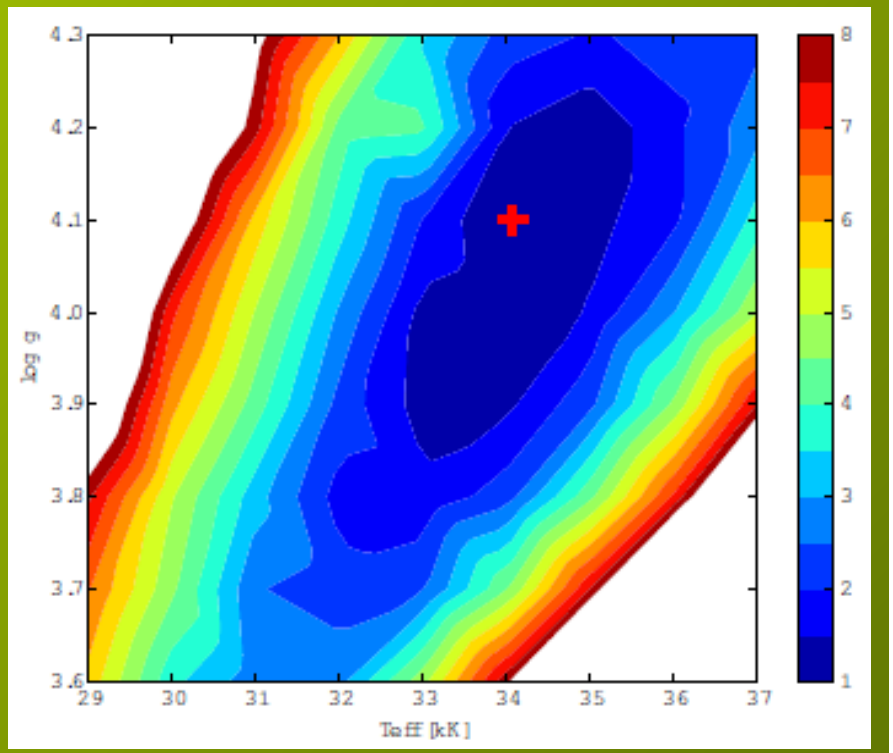
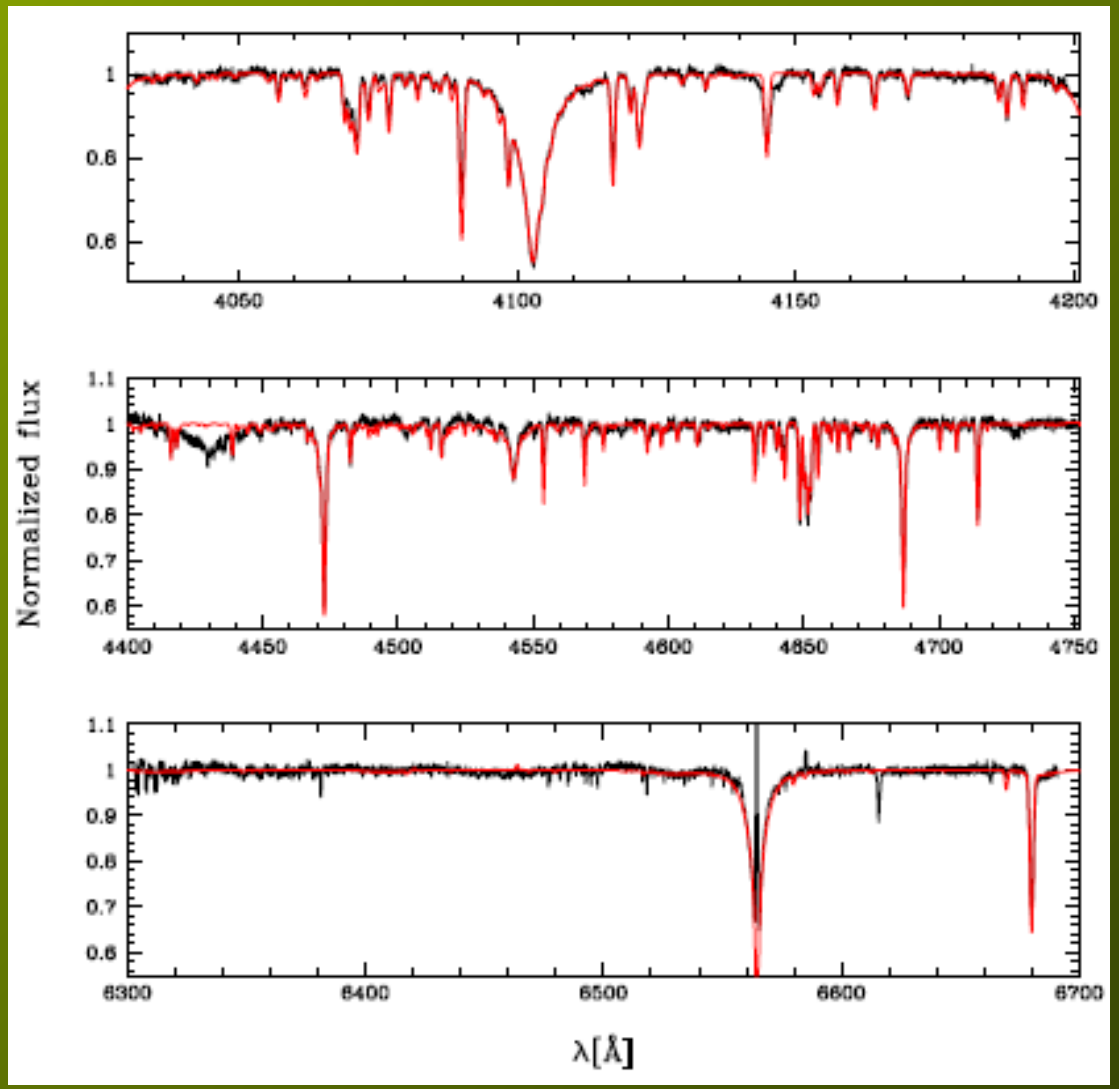
Results

- ALS 15-206 :



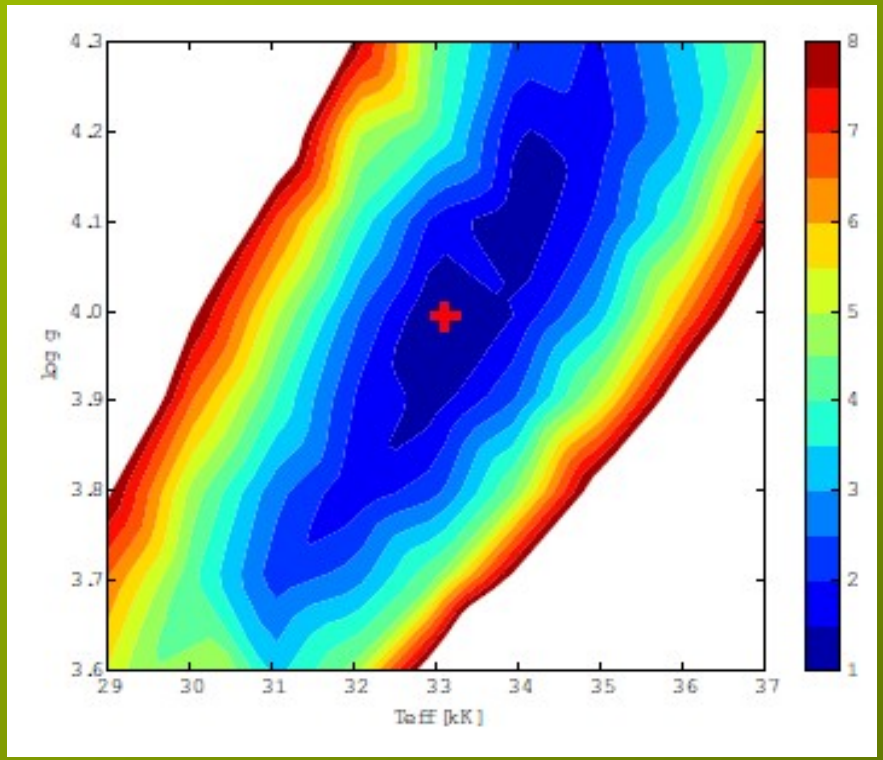


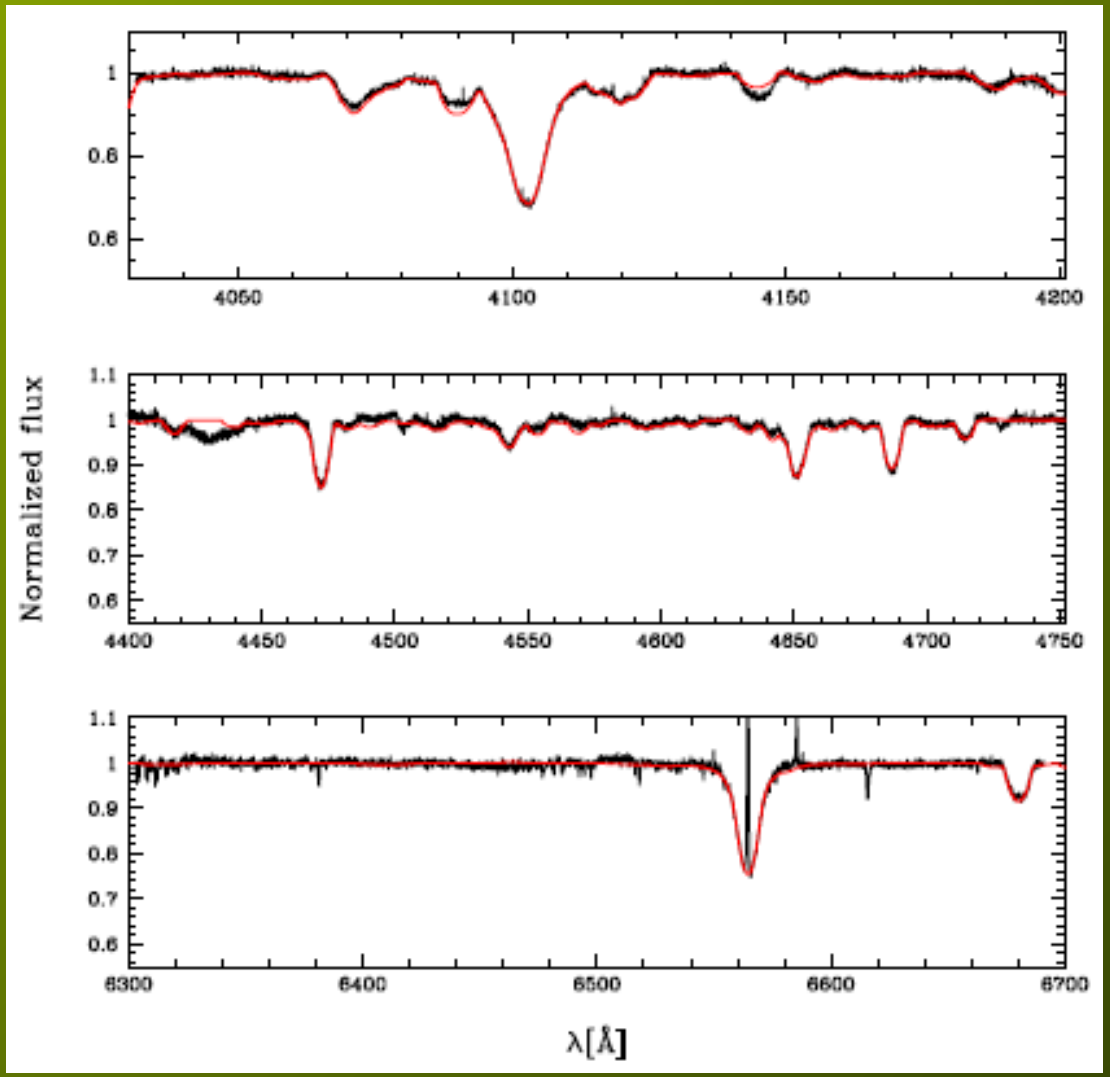
By eye : Teff = 34000 K

Logg = 4.1

Results

- CPD -58 2627 :

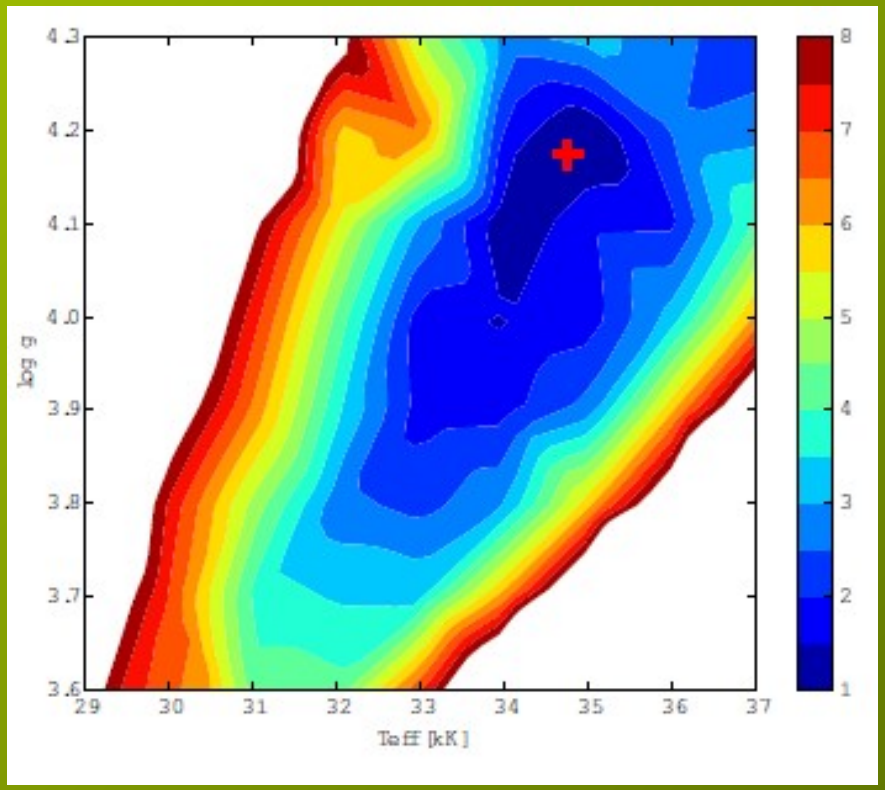




By eye : Teff = 33500 K
Logg = 4.1

Results

- CPD -59 2627 :



By eye : Teff = 35000 K
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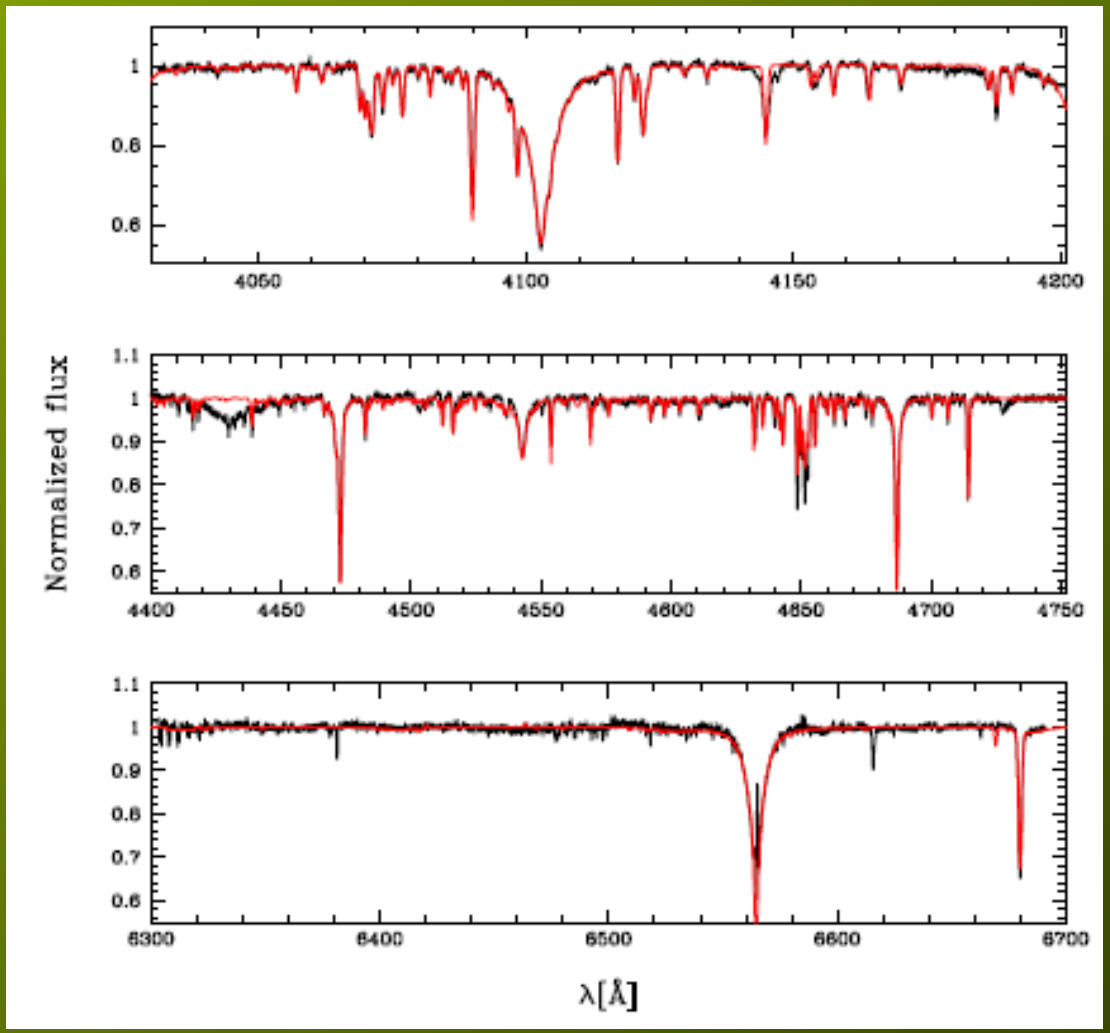


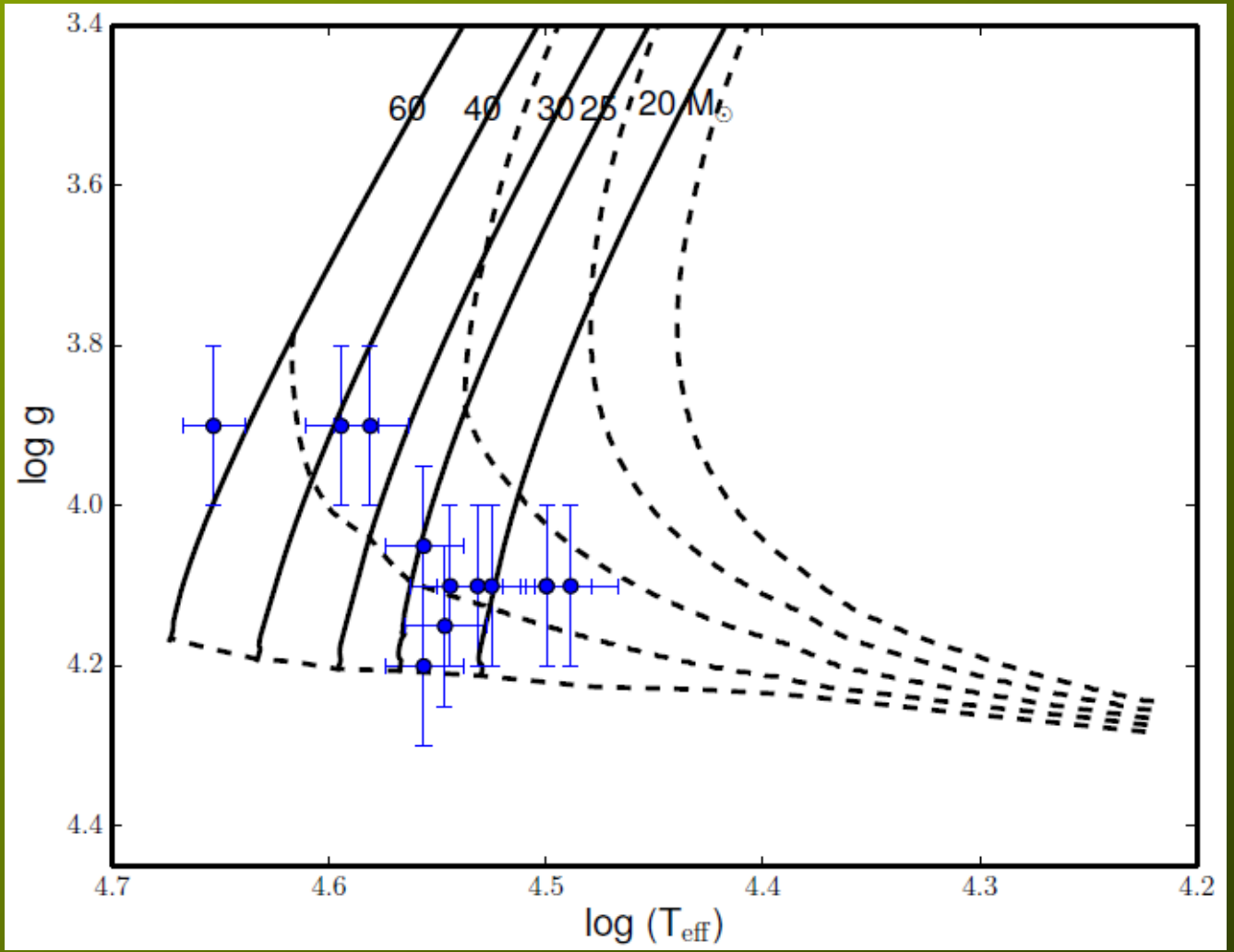
Results

- Both methods are consistent
- HR Diagram :

Stars seem to be around 2 ± 2 Myrs

Only the hottest star is a giant, the others are dwarfs

For late O stars, CNO abundances appear to be solar. For the other stars, it is under investigation

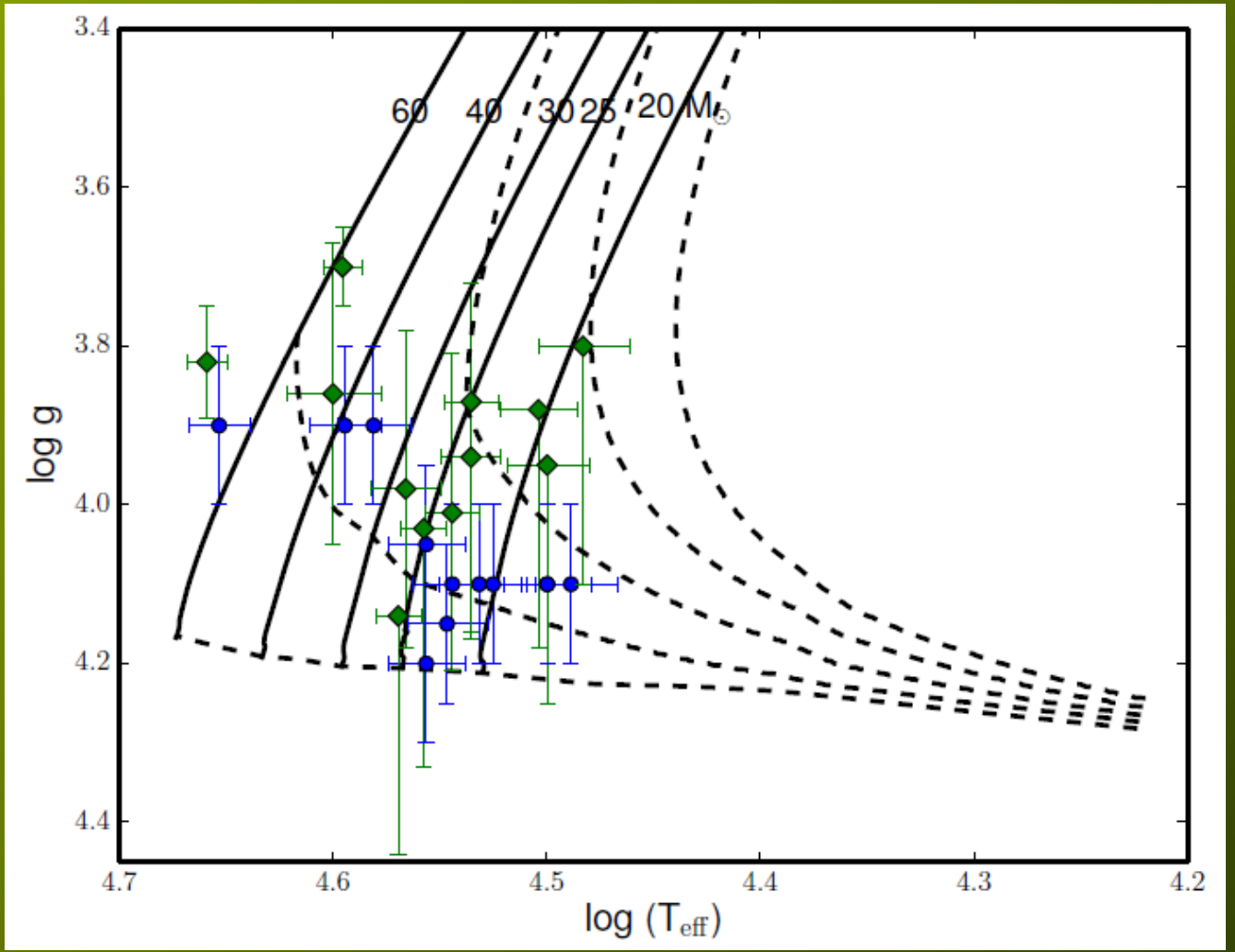


Results

- Both methods are consistent
- HR Diagram :

With Fastwind, it appears lower log g but same range of Teff

But still preliminary results !



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- Discover where the differences between both codes come from
- Continue to determine the Teff-logg parameters to allow a better estimation of the CNO abundances