

# Interstellar absorption features in the spectra of nearby stars

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## 1 Introduction

- Influence of interstellar matter on “stellar” spectra
- What is known about the local environment?

## 2 Contamination by Telluric lines

- Really important?

## 3 Inter-comparison between F-stars

- Stellar Properties
- Results

## 4 Comparison between PHOENIX models and data

- DIB (5780Å)
- interstellar Na D lines

## 5 Comparison between solar models and measured spectra

- What is better? PHOENIX or ATLAS?

## 6 Conclusions

# Interstellar Clouds

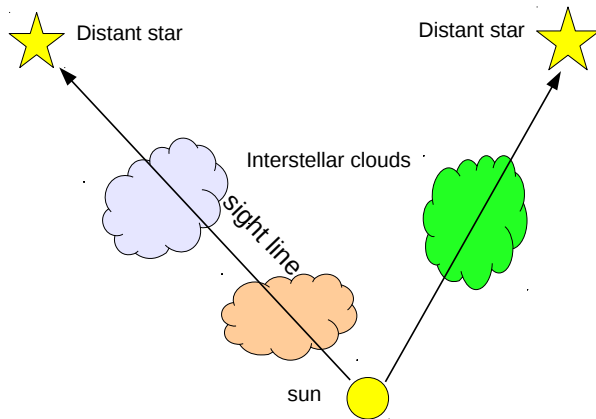


Figure: How interstellar matter influences stellar spectra.

## ... and their spectra

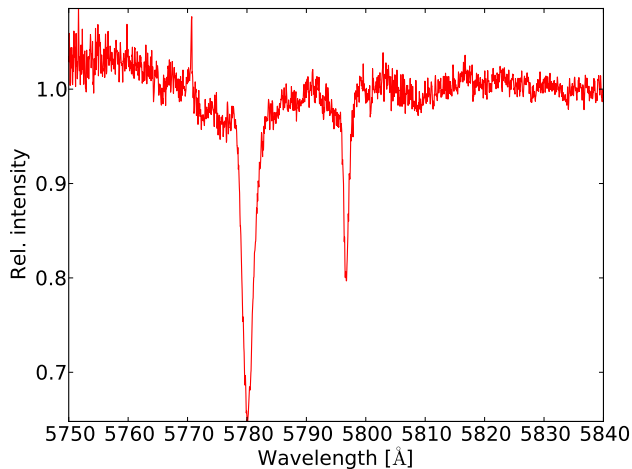


Figure: DIB detection of interstellar features in HD 183143.

## ... and their spectra

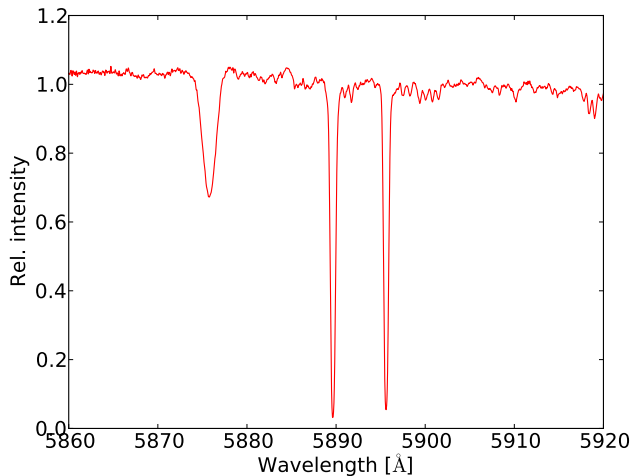
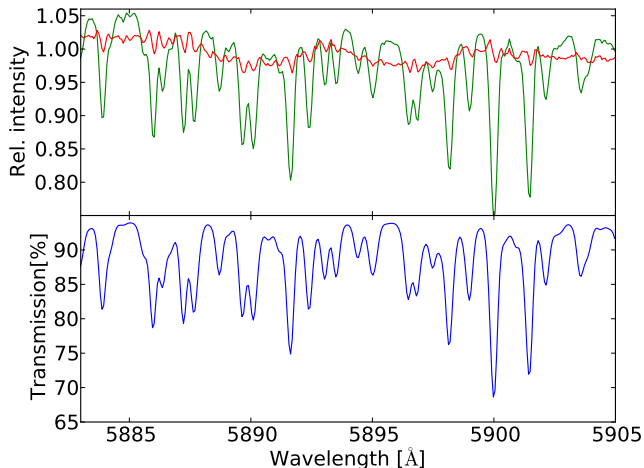


Figure: NaD detection of interstellar features in HD 183143.

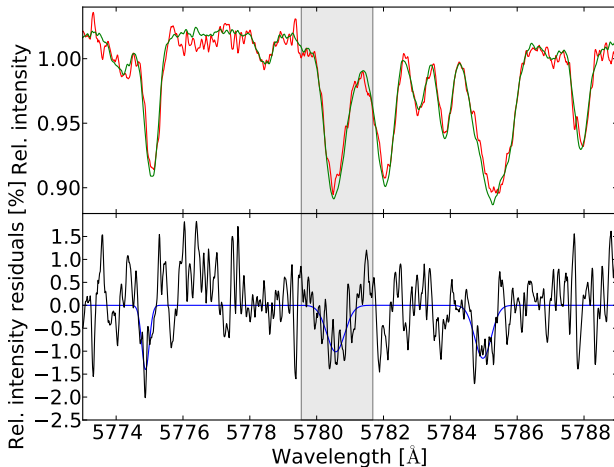
- most easily found in distant and early-type stars
- strong dependence of the line of sight
- in solar neighbourhood:
  - search in spectra of early-type stars
  - low equivalent-widths:
    - NaD in  $d < 70$  pc  $\rightarrow$  generally below 10 mÅ.
    - DIB in  $d < 200$  pc  $\rightarrow$  generally below 100 mÅ.
- Farhang et al. 2015:
  - search in  $\tau$ Boo –  $d = 64$  pc (Hipparcos)
  - 137 mÅ (DIB at 5780Å)
  - 407 mÅ (D2)
  - 344 mÅ (D1)

# Contamination by Telluric lines



**Figure:** Top panel: uncorrected stellar spectrum of  $\alpha$ CrB (red), corrected stellar spectrum (green). Bottom panel: telluric transmission spectrum.

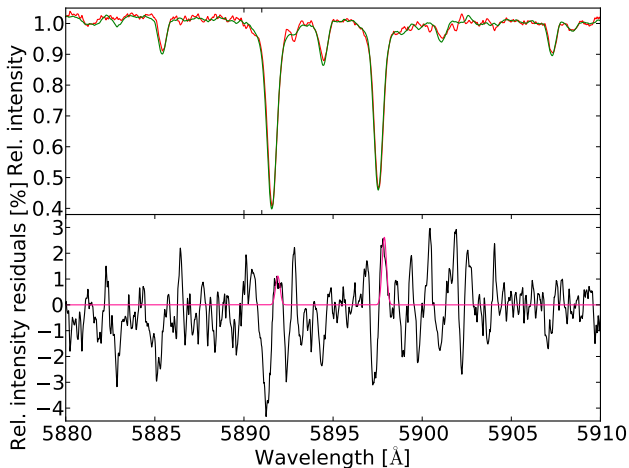
# Inter-comparison between F-stars



**Figure:** Top panel: Comparison of  $\tau$  Boo (green) and HD 33608 (red). Bottom panel: residuals (black) and Gaussian fit (blue).



# Inter-comparison between F-stars



**Figure:** Top panel: Comparison of  $\tau$ Boo (green) and HD 33608 (red). Bottom panel: residuals (black) and Gaussian fit (pink).

# DIB in $\tau$ Boo's sight line?

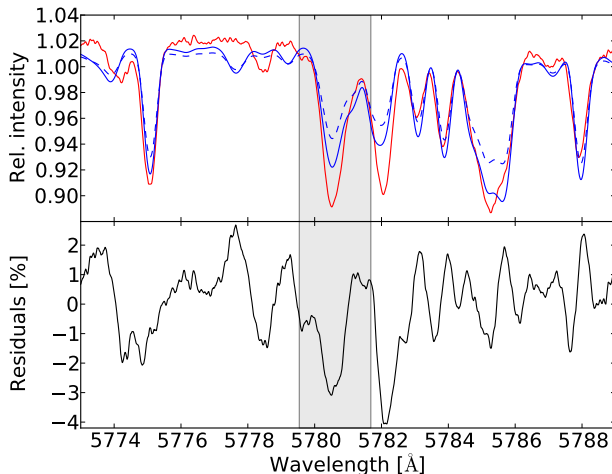


Figure: Spectrum of  $\tau$ Boo (red) and PHOENIX models (blue). Bottom panel: residuals (black).

# DIB in $\tau$ Boo's sight line?

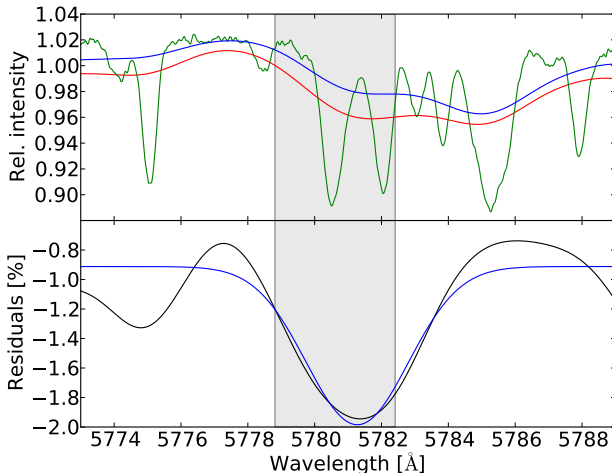
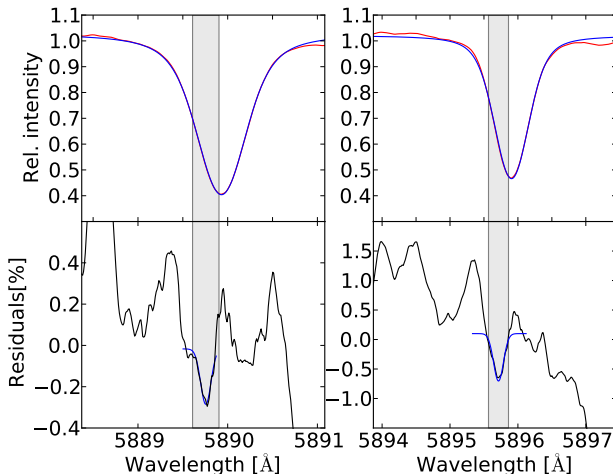


Figure: Spectrum of  $\tau$ Boo (red) and PHOENIX models (blue). Bottom panel: residuals (black) and Gaussian fit (blue).

# Interstellar Na in $\tau$ Boo's sight line?



**Figure:** Spectrum of  $\tau$ Boo (red) Voigt profile fit (blue). Bottom panel: residuals (black) and Voigt fit (blue).

# Interstellar Na in $\tau$ Boo's sight line?

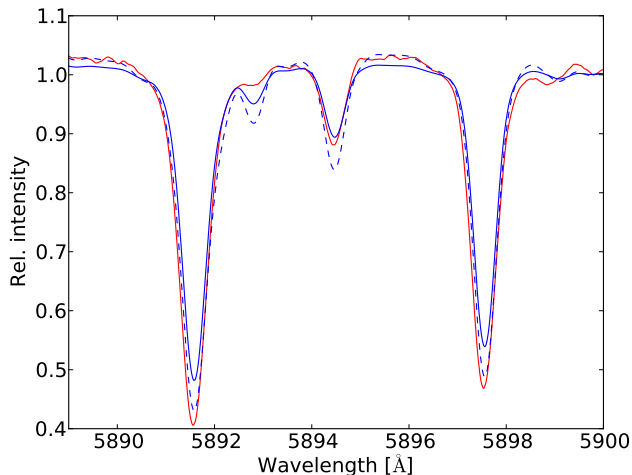
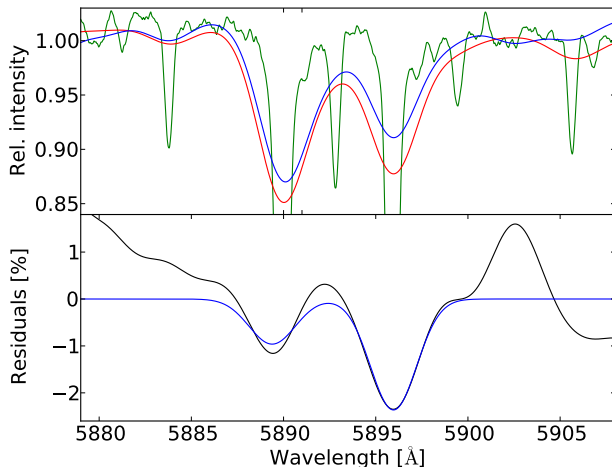


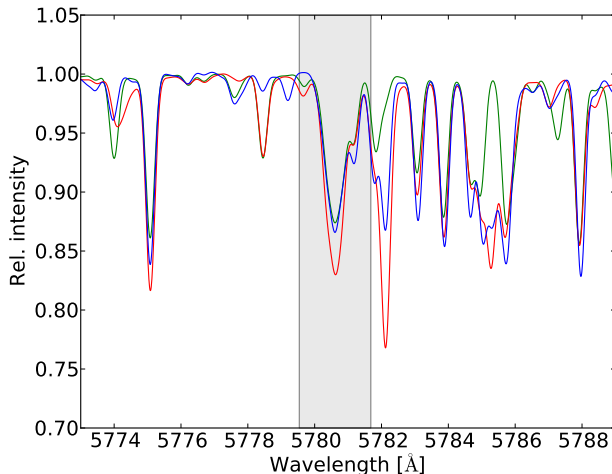
Figure: Spectrum of  $\tau$ Boo (red) and PHOENIX models (blue).

# Interstellar Na in $\tau$ Boo's sight line?



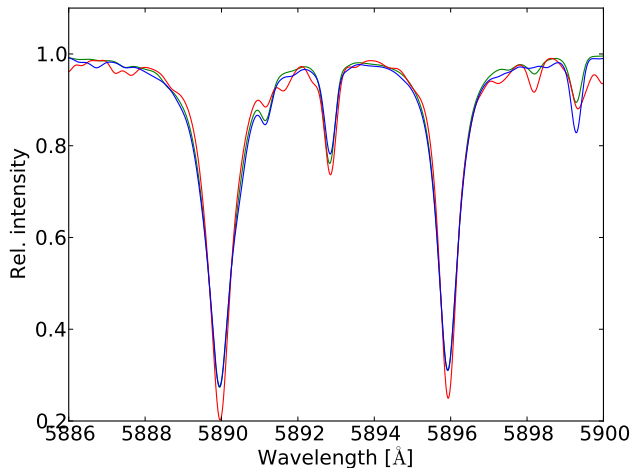
**Figure:** Spectrum of  $\tau$ Boo (red) and PHOENIX model (blue). Broadened to  $R=2,000$ . Original observation (green).

# Solar lines around 5780Å



**Figure:** Comparison of observed (red) solar spectrum to different models. Blue: PHOENIX. Green: ATLAS.

# Solar Na D lines



**Figure:** Comparison of observed (red) solar spectrum to different models. Blue: PHOENIX. Green: ATLAS.



# Conclusions

- neither a DIB nor a Na D feature of abnormal strength could be found
- low spectral resolution leads to blending and thus complicates the detection of interstellar features
- discrepancies also in solar spectra
  - inaccuracies in atomic line lists
  - concept of metallicity ill defined
- Thank you for your attention!
- Questions?