Abundance mapping of HD 114365

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Chemically Peculiar (CP) stars

- stars with unusual features in their spectra caused by abnormal abundance of heavier elements in their surface layers
- spectral types B, A, and F
- the peculiarity only affects a very thin surface layer of the star
- radiative diffusion
- magnetic field
- obvious correlation between the type of the peculiarity and $T_{\rm eff}$
- slow rotation ($<$100 kms^{-1})

Classification (Preston, Maitzen)

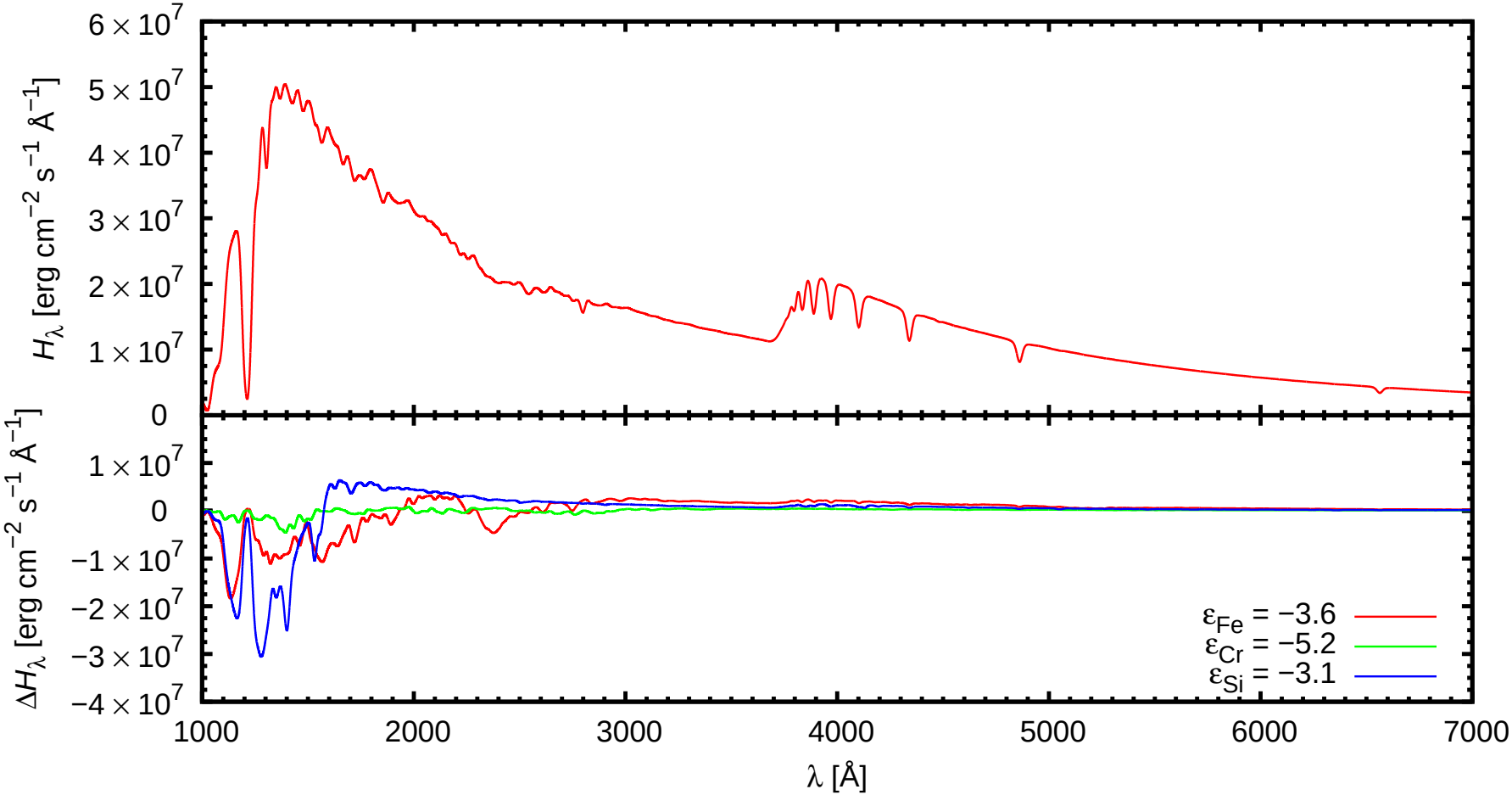
- CP1 (Am stars) – Metallic stars, usually without strong magnetic field
- CP2 (Ap and Bp Stars) – Usually strong magnetic field
- CP3 – HgMn stars
- CP4,5 – He-weak stars
- CP6,7 – He-strong stars

Variability of CP stars

- inhomogenous horizontal distribution of heavier elements
- line blanketing, backwarming, spectral energy redistribution (Molnar 1973)
- rotation of the star
- photometric variability

$$\Delta m = A_0 + A_1 \sin\left(\frac{2\pi(t - t_0)}{P} + \phi_1\right) + A_2 \sin\left(\frac{4\pi(t - t_0)}{P} + \phi_2\right)$$

- line profile variations

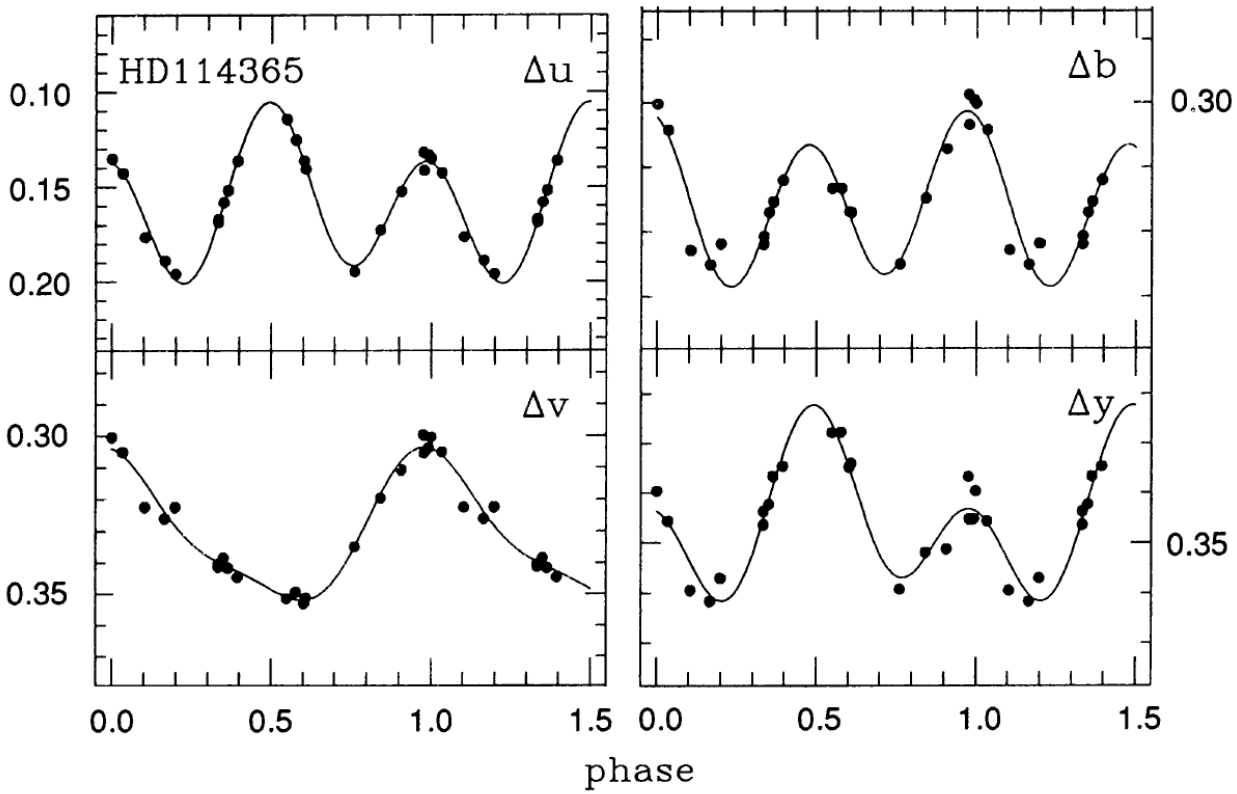


Upper plot: Emergent flux from a reference model atmosphere with roughly solar composition. *Lower plot:* Emergent flux from the model atmospheres with increased abundance of silicon and iron, respectively, minus the flux from the reference model (Prvák & al. 2014).

HD 114365

- spectral type A0
- effective temperature $T_{\rm eff} = 13\,200$ K
- surface gravity $\log g = 4.2$
- rotational period $P \approx 1^{\rm d}.27$
- moderate strength magnetic field $B_{\rm l} \approx 325$ G

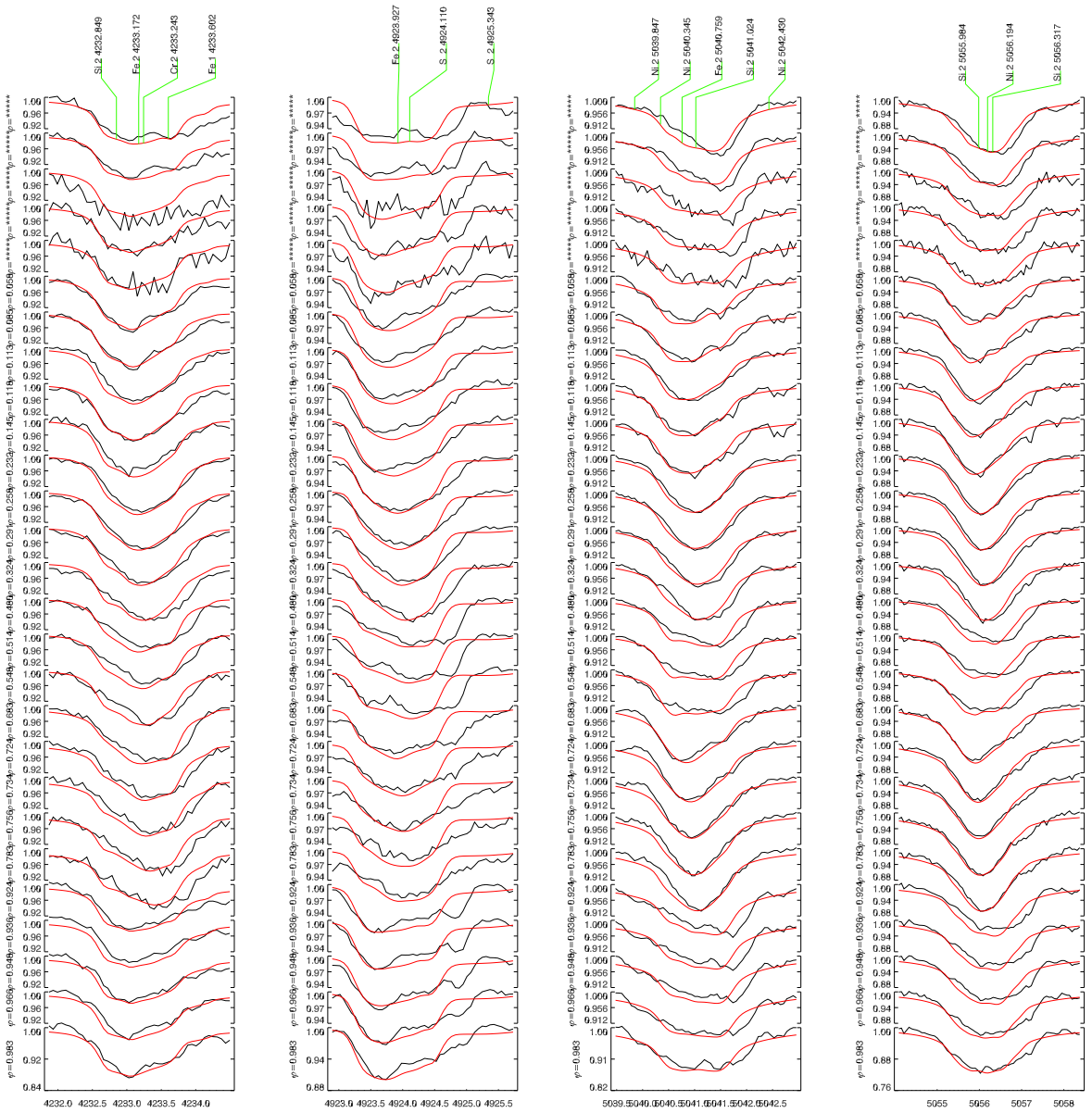
Variability of HD 114365



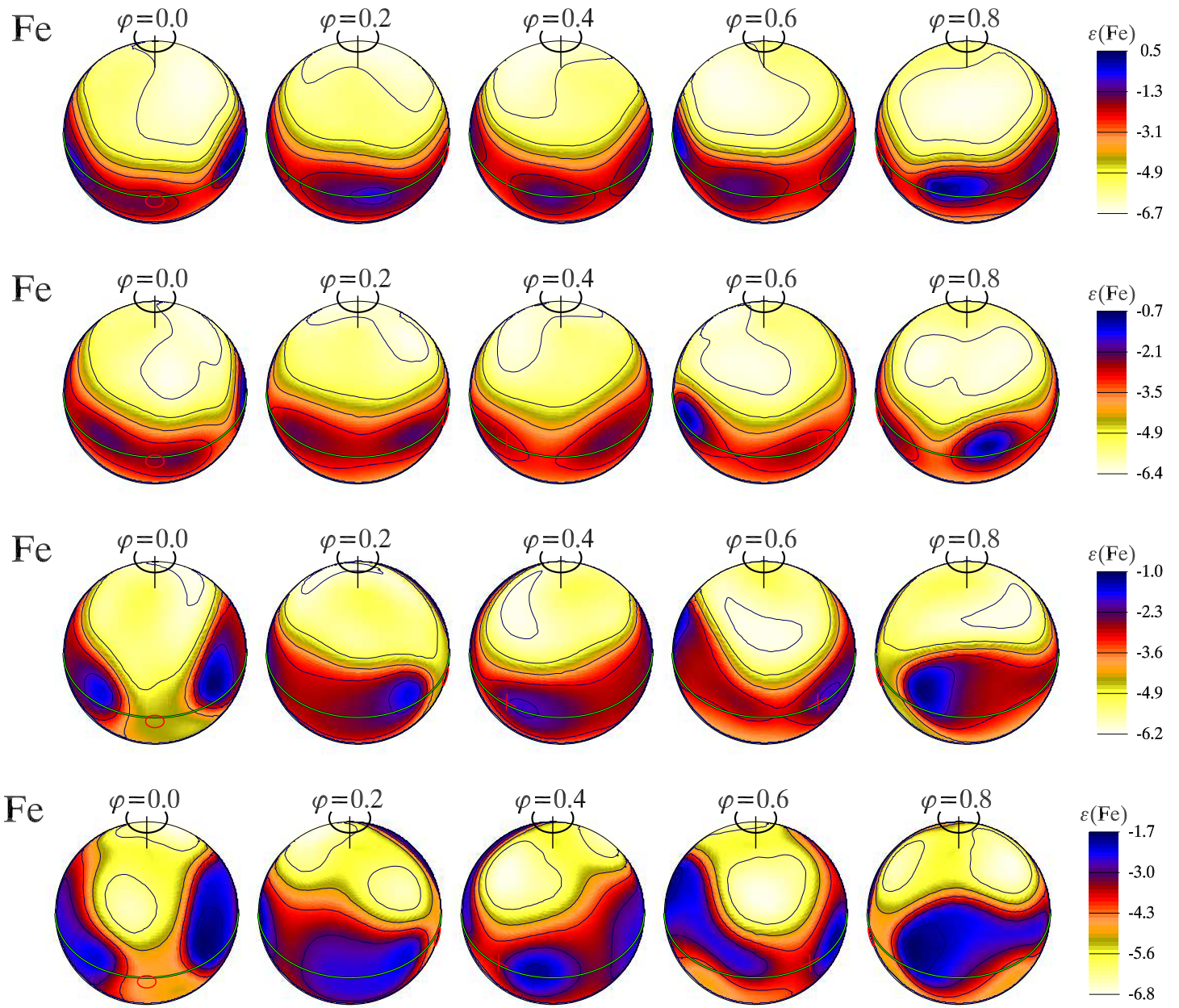
Light curves of HD 114365 in the u, v, b, and y bands of the Strömgren photometric system (Catalano & Leone, 1993)

Getting the abundance maps

- 27 spectra (2.2m ESO/MPG, FEROS, proposals 089.D-0153 and 087.D-0099)
- LLModels LTE plane-parallel model atmospheres
- Synth3
- Invers12



Line profile fits for Fe 4233, Fe 4923, Si 5041, and Si 5055, respectively.



Abundance maps for derived from Fe 4233, Fe 4923, Si 5041, and Si 5055 lines, respectively.

What remains to be done?

- Compute abundance maps for more lines
- Refine stellar parameters
- Compute theoretical light curve from obtained maps and compare it to the observed light curve

Thank you for your attention!