

# libraries of synthetic spectra

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early, small libraries computed in **Trieste**  
(Munari & Castelli 2000, Castelli & Munari 2001)  
exploring ~ 1,000 combinations of parameters)

in 2001 we begun in **Asiago** a larger computation effort  
(exploring ~ 50,000 combinations of parameters)  
to assemble complete and homogeneous libraries  
useful in addressing spectroscopic and well as  
photometric issues related to GAI A planning

the Asiago libraries are based on **Kurucz's suite**.  
They are not meant to be the ultimate libraries,  
those to be used in the final GAI A pipeline, but  
just a usefull tool to takle *now* some issues.  
Better ones will surely become available in  
coming years

two main outputs:

Zwitter, Castelli, Munari 2004, A&A 417, 1055

" An extensive library of synthetic spectra covering the far red, RAVE and GAIA wavelengths "

Munari, Sordo, Zwitter, Castelli 2004, A&A submitted

" A synthetic 2500-10500 Å spectral library "

their aims:

7650-8750 Å

Zwitter, Castelli, Munari 2004 A&A 417, 1055

- simulations of GAIA spectral observations and data handling
- simulation of automatic analysis of GAIA spectra via MDM techniques

2500-10500 Å

Munari, Sordo, Zwitter, Castelli 2004 submitted

- calibration of photometric systems
- comparison on the same grounds of photometric and spectroscopic performances
- spectra ready in case of filter leaks
- integration to the previous library by adopting new ODFs

new ODFs (Castelli and Kurucz 2003):

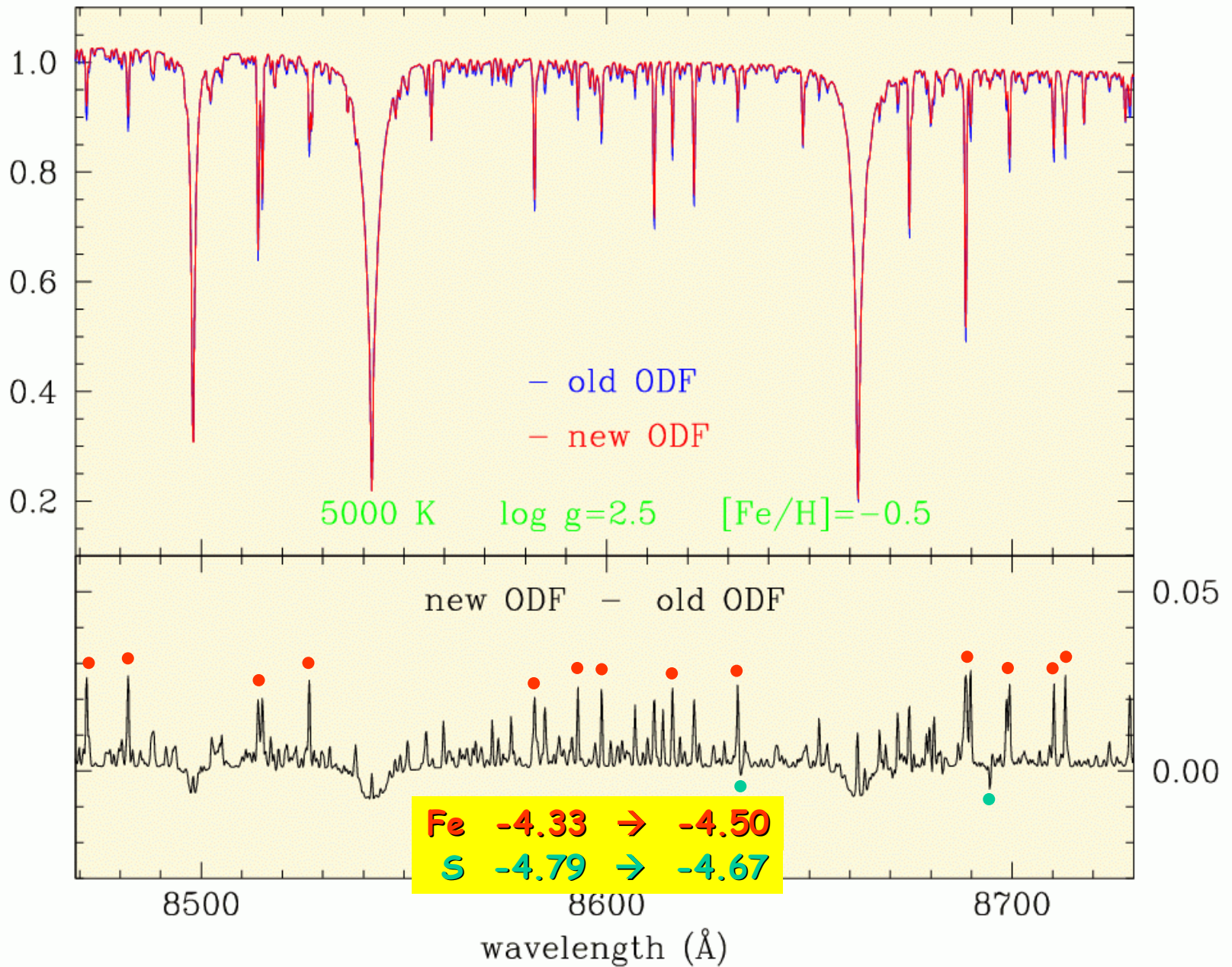
- replacement of solar abundances of Anders & Grevesse with those of Grevesse & Sauval (1998)

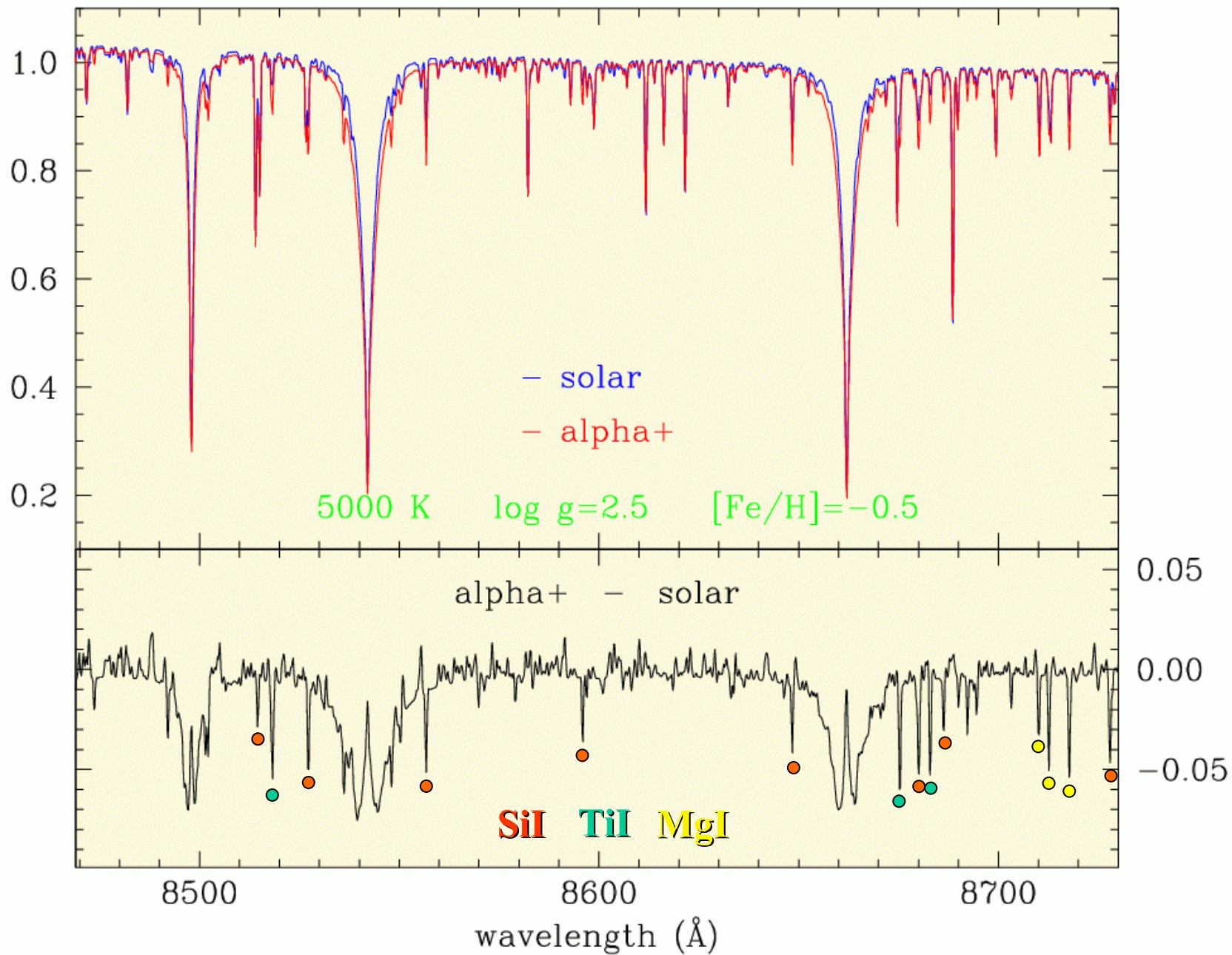
log N/H: Fe -4.33 → -4.50  
S -4.79 → -4.67

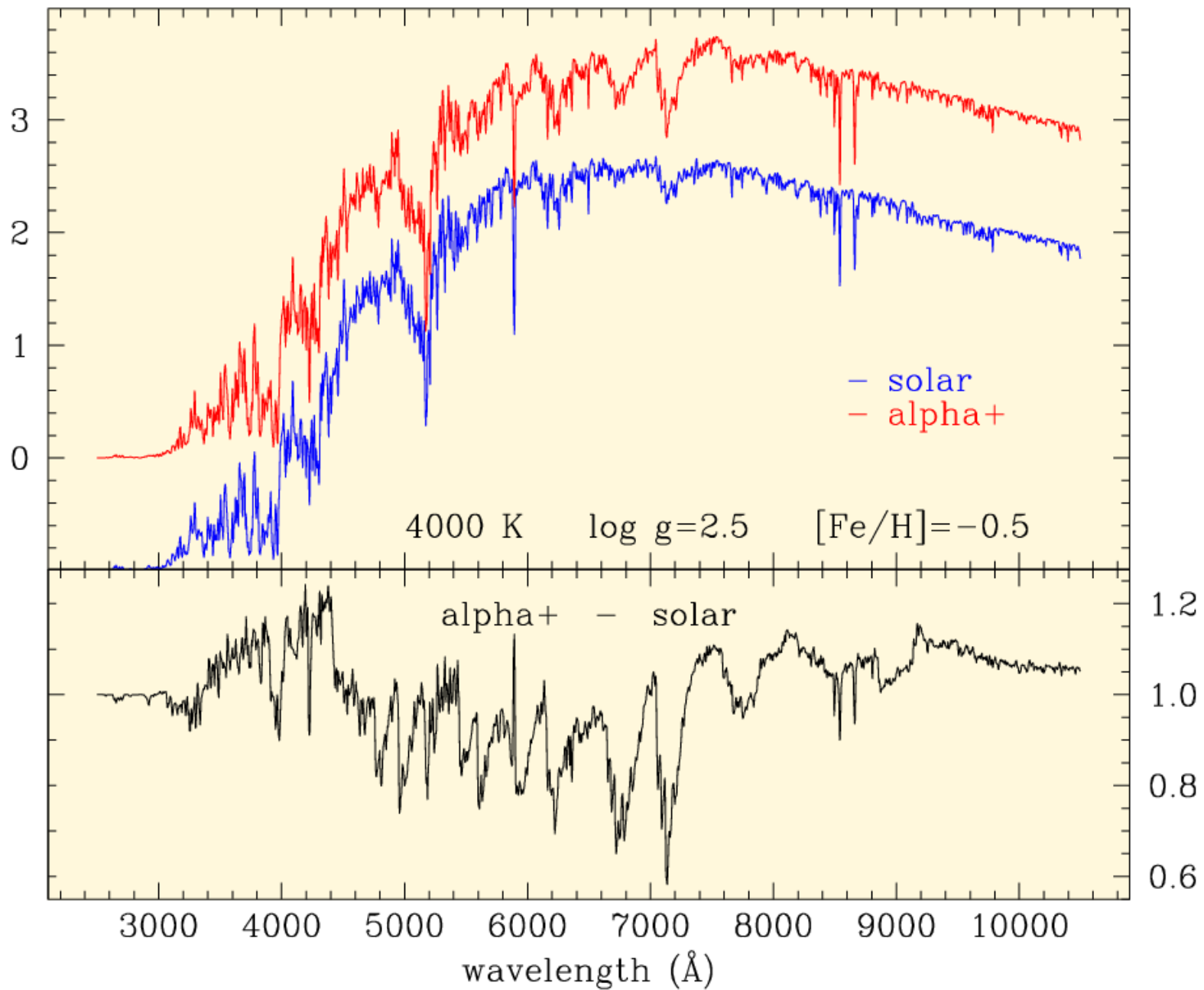
- TiO from Schwenke (1998)

- H<sub>2</sub>O from Partridge & Schwenke (1998)

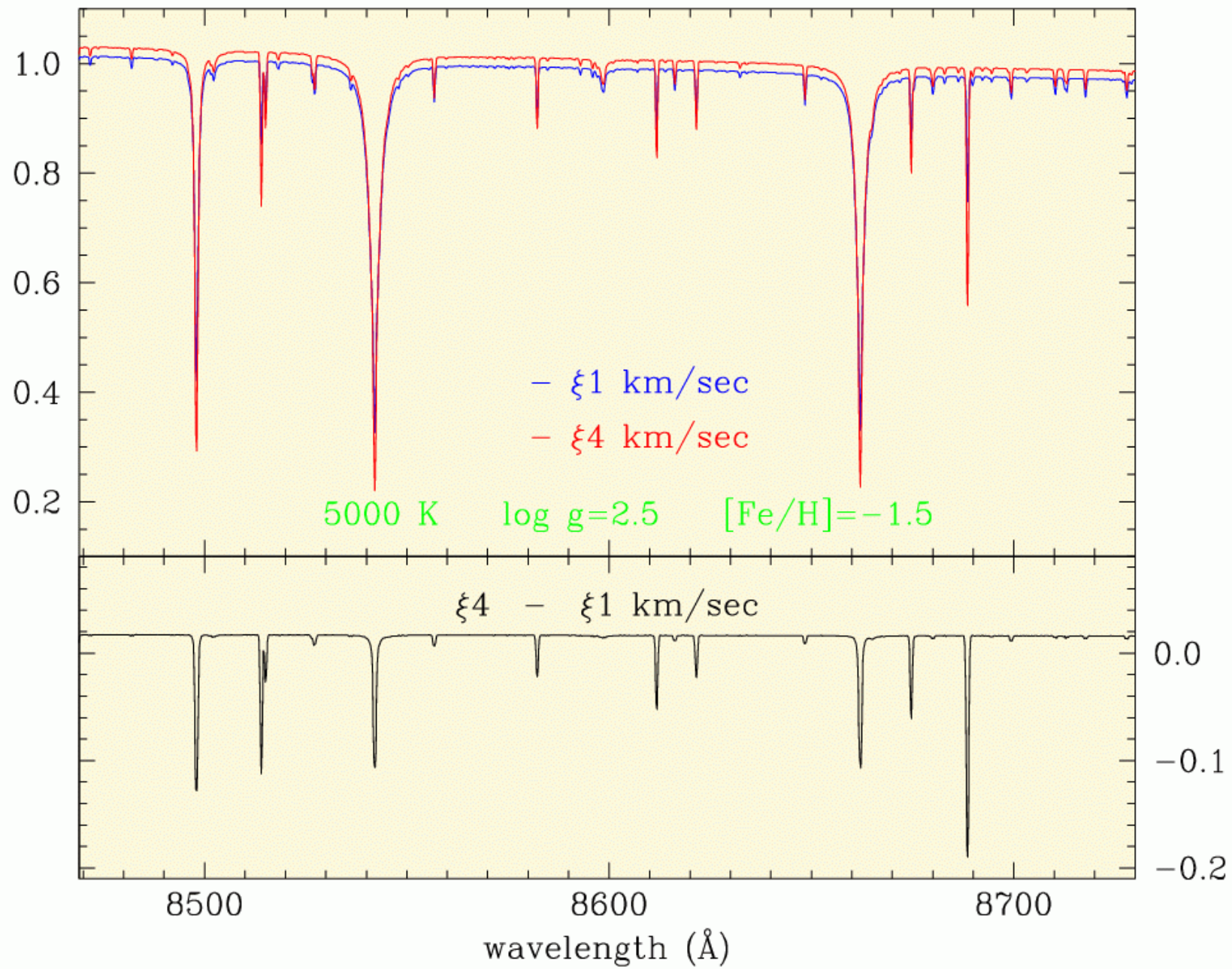
- addition of HI-HI and HI-H<sup>+</sup> quasi molecular absorptions from Allard et al. (1998)





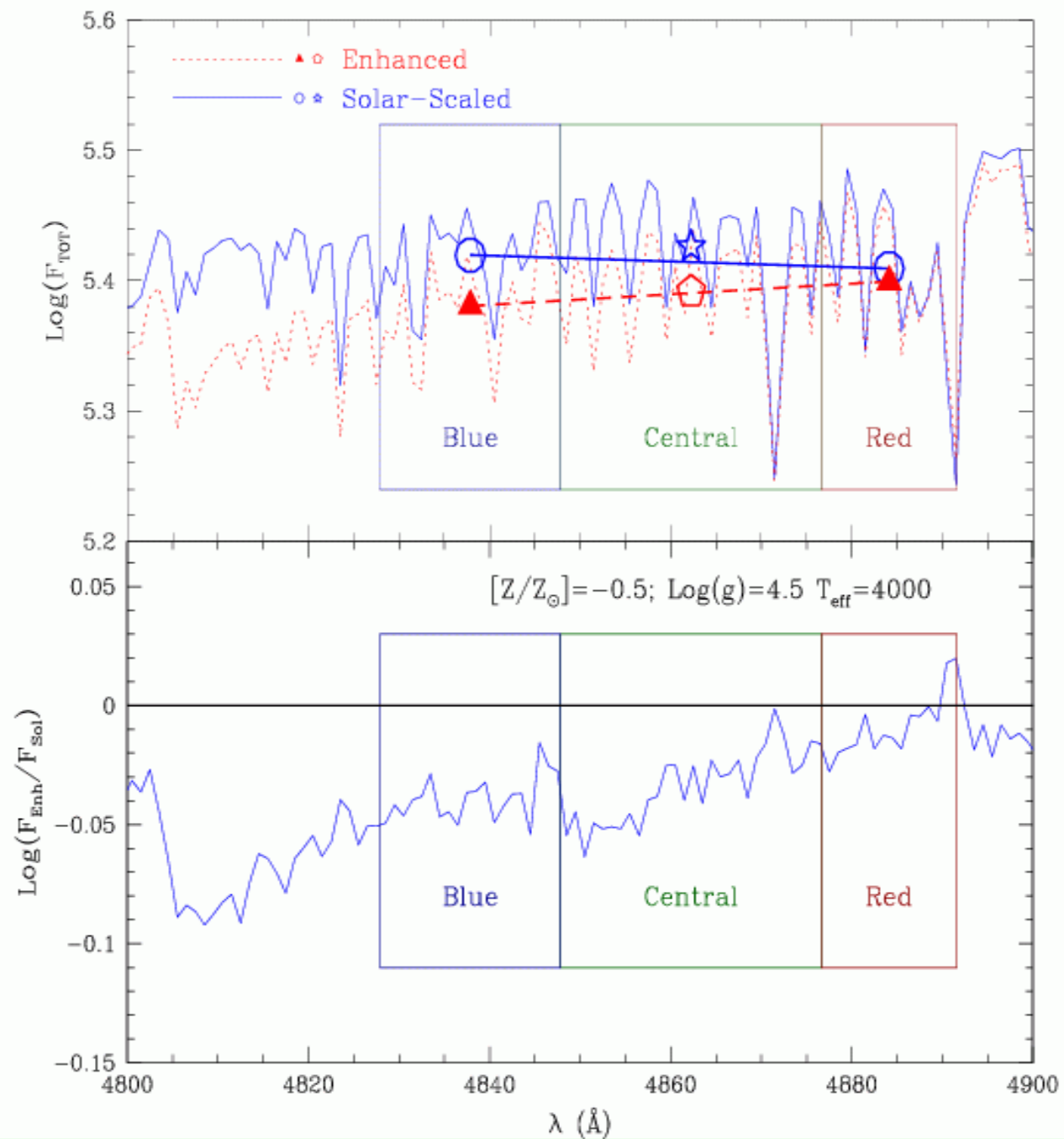


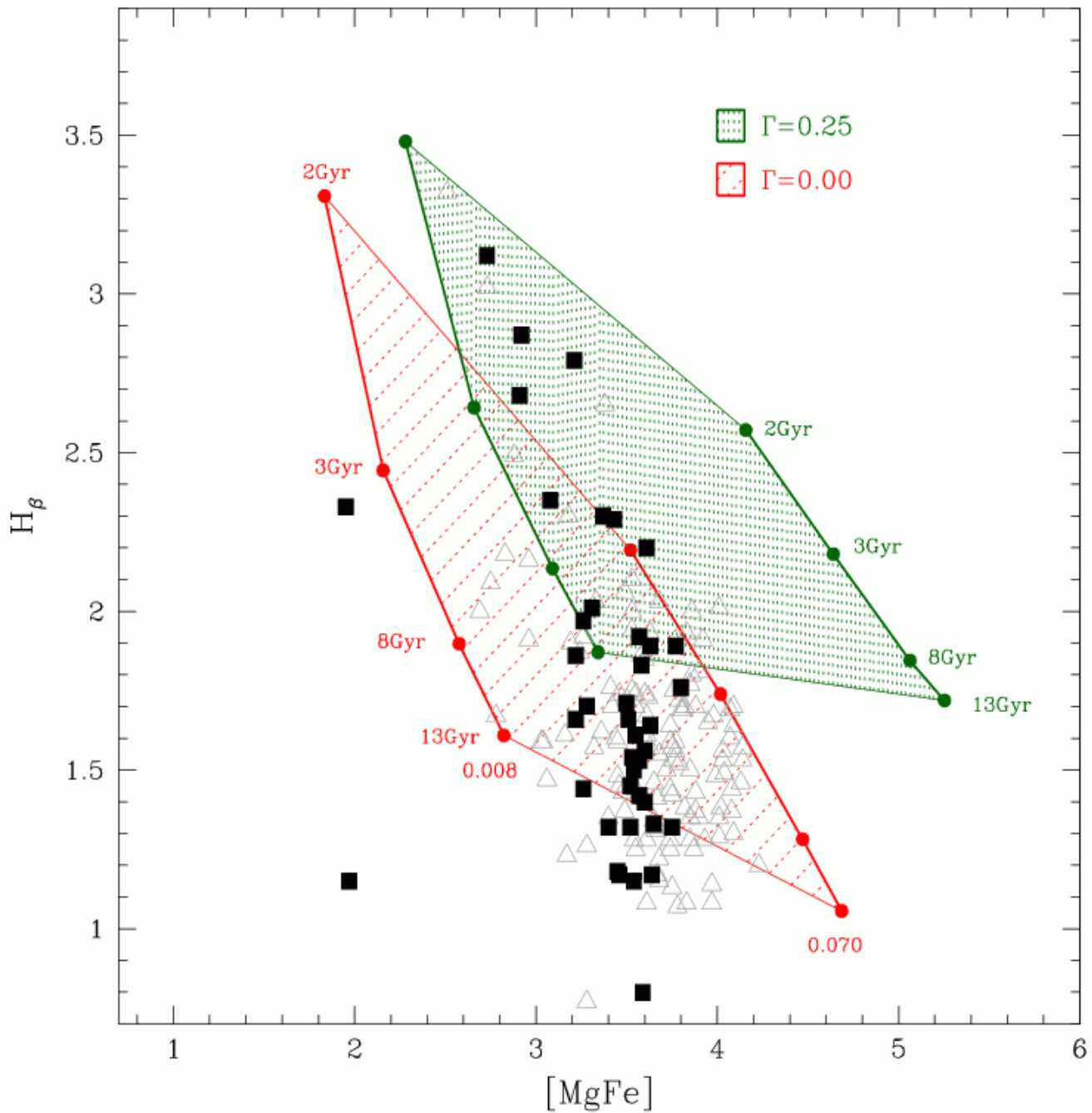




# Lick stellar population indices

Index	Type	Central Band		Blue Continuum		Red Continuum	
CN <sub>1</sub>	Mag	4142.125	4177.125	4080.125	4117.625	4244.125	4284.125
CN <sub>2</sub>	Mag	4142.125	4177.125	4083.875	4096.375	4244.125	4284.125
Ca <sub>4227</sub>	EW	4222.250	4234.750	4211.000	4219.750	4241.000	4251.000
G <sub>4300</sub>	EW	4281.375	4316.375	4266.375	4282.625	4318.875	4335.125
Fe <sub>4383</sub>	EW	4369.125	4420.375	4359.125	4370.375	4442.875	4455.375
Ca <sub>4455</sub>	EW	4452.125	4474.625	4445.875	4454.625	4477.125	4492.125
Fe <sub>4531</sub>	EW	4514.250	4559.250	4504.250	4514.250	4560.500	4579.250
C <sub>24668</sub>	EW	4634.000	4720.250	4611.500	4630.250	4742.750	4756.500
H $\beta$	EW	4847.875	4876.625	4827.875	4847.875	4876.625	4891.625
Fe <sub>5015</sub>	EW	4977.750	5054.000	4946.500	4977.750	5054.000	5065.250
Mg <sub>1</sub>	Mag	5069.125	5134.125	4895.125	4957.625	5301.125	5366.125
Mg <sub>2</sub>	Mag	5154.125	5196.625	4895.125	5161.375	5191.375	5206.375
Fe <sub>5270</sub>	EW	5245.650	5285.650	5233.150	5148.150	5285.650	5318.150
Fe <sub>5335</sub>	EW	5312.125	5352.125	5304.625	5315.875	5353.375	5363.375
Fe <sub>5406</sub>	EW	5387.500	5415.000	5376.250	5387.500	5415.000	5425.000
Fe <sub>5709</sub>	EW	5696.625	5720.375	5672.875	5696.625	5722.875	5736.625
Fe <sub>5782</sub>	EW	5776.625	5796.625	5765.375	5775.375	5797.875	5811.625
NaD	EW	5876.875	5909.375	5860.625	5875.625	5922.125	5948.125
TiO <sub>1</sub>	Mag	5936.625	5994.125	5816.625	5849.125	6038.625	6103.625
TiO <sub>2</sub>	Mag	6189.625	6272.125	6066.625	6141.625	6372.625	6415.125
H $\delta$ <sub>A</sub>	EW	4083.500	4122.250	4041.600	4079.750	4128.500	4161.000
H $\gamma$ <sub>A</sub>	EW	4319.750	4363.500	4283.500	4319.750	4367.250	4419.750
H $\delta$ <sub>F</sub>	EW	4091.000	4112.250	4057.250	4088.500	4114.750	4137.250
H $\gamma$ <sub>F</sub>	EW	4331.250	4352.250	4283.500	4319.750	4354.750	4384.750
D <sub>4000</sub>				3750.000	3950.000	4050.000	4250.000





# Asiago Database on Photometric Systems

## vol. 1

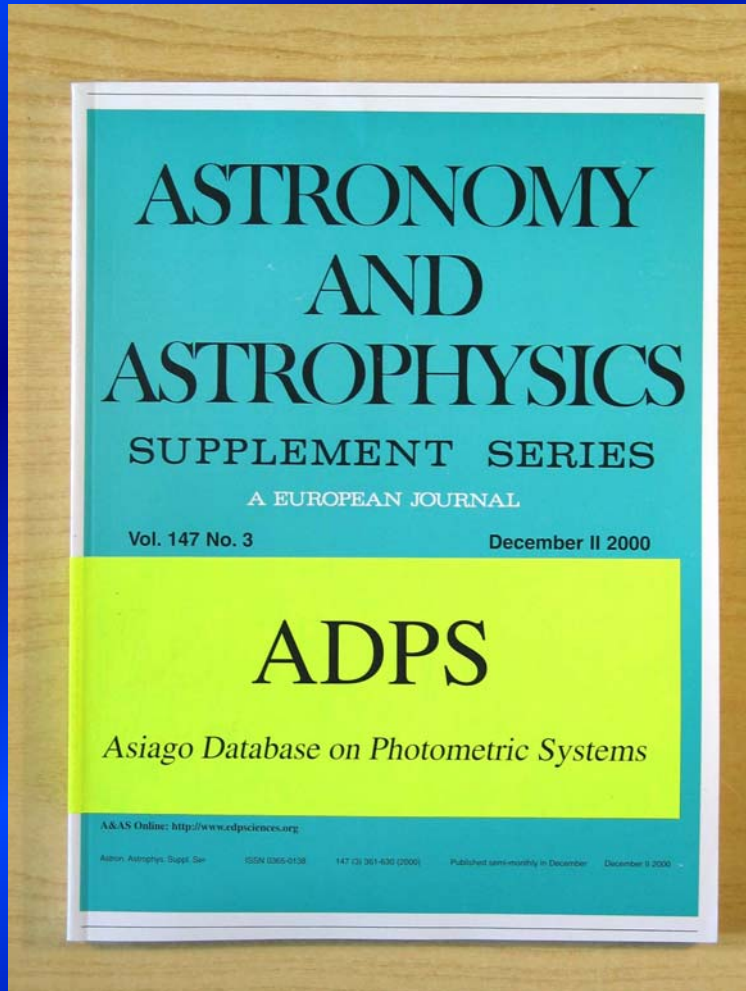
Moro, Munari 2000 *A&AS* 147, 361

## vol. 2

Fiorucci, Munari 2003 *A&A* 401, 781

## vol. 3

to be submitted in 2005



# Asiago Database on Photometric Systems

231 systems reviewed so far

vol. 1

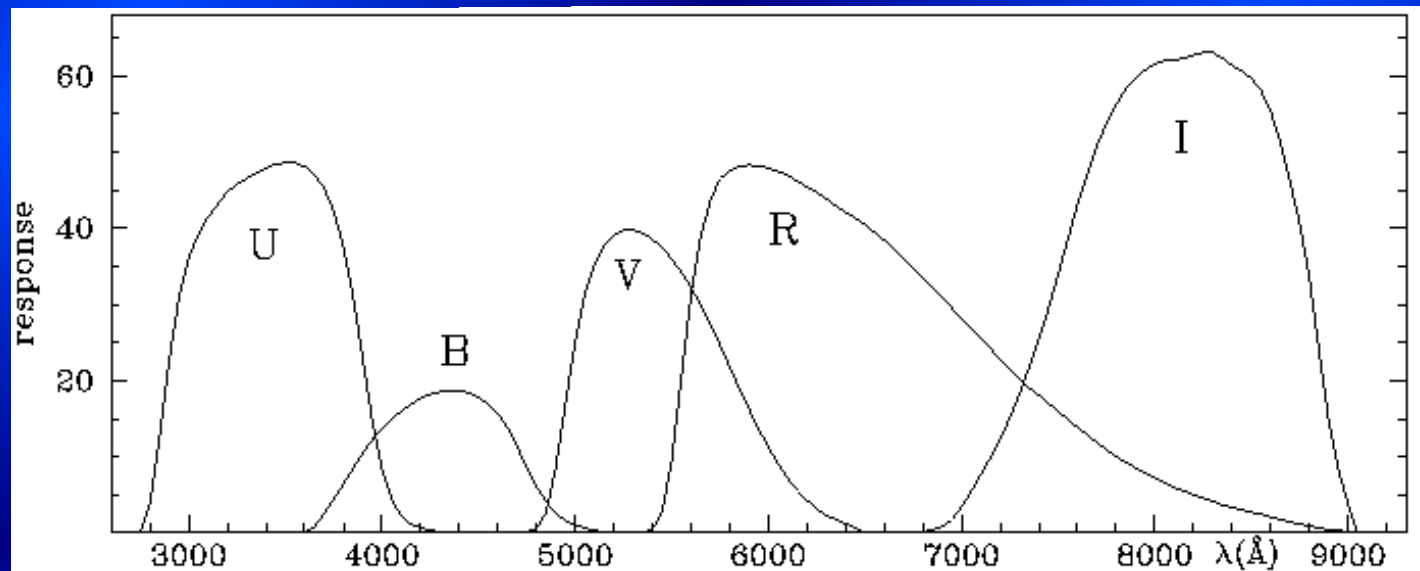
Moro, Munari 2000 A&AS 147, 361

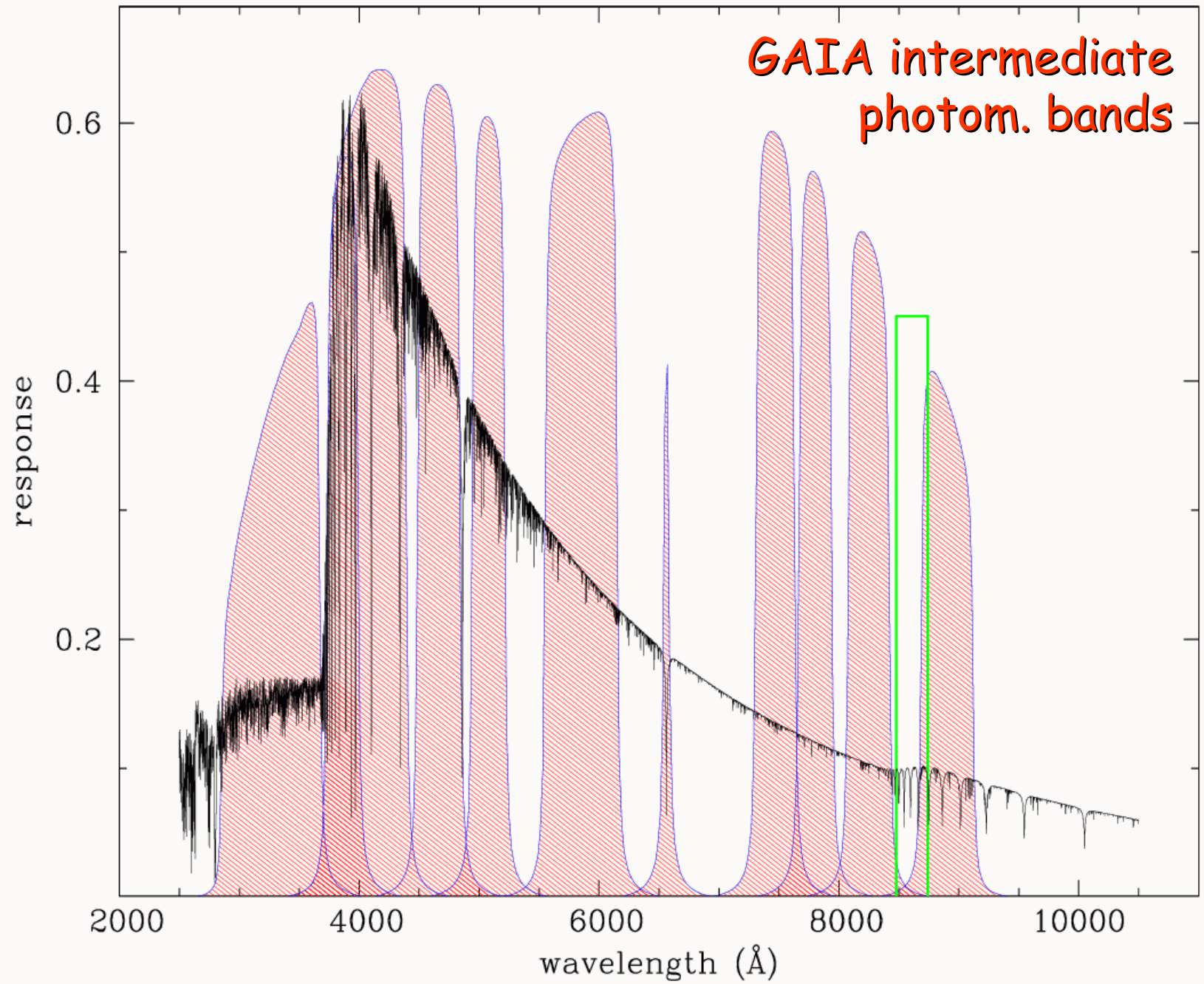
vol. 2

Fiorucci, Munari 2003 A&A 401, 781

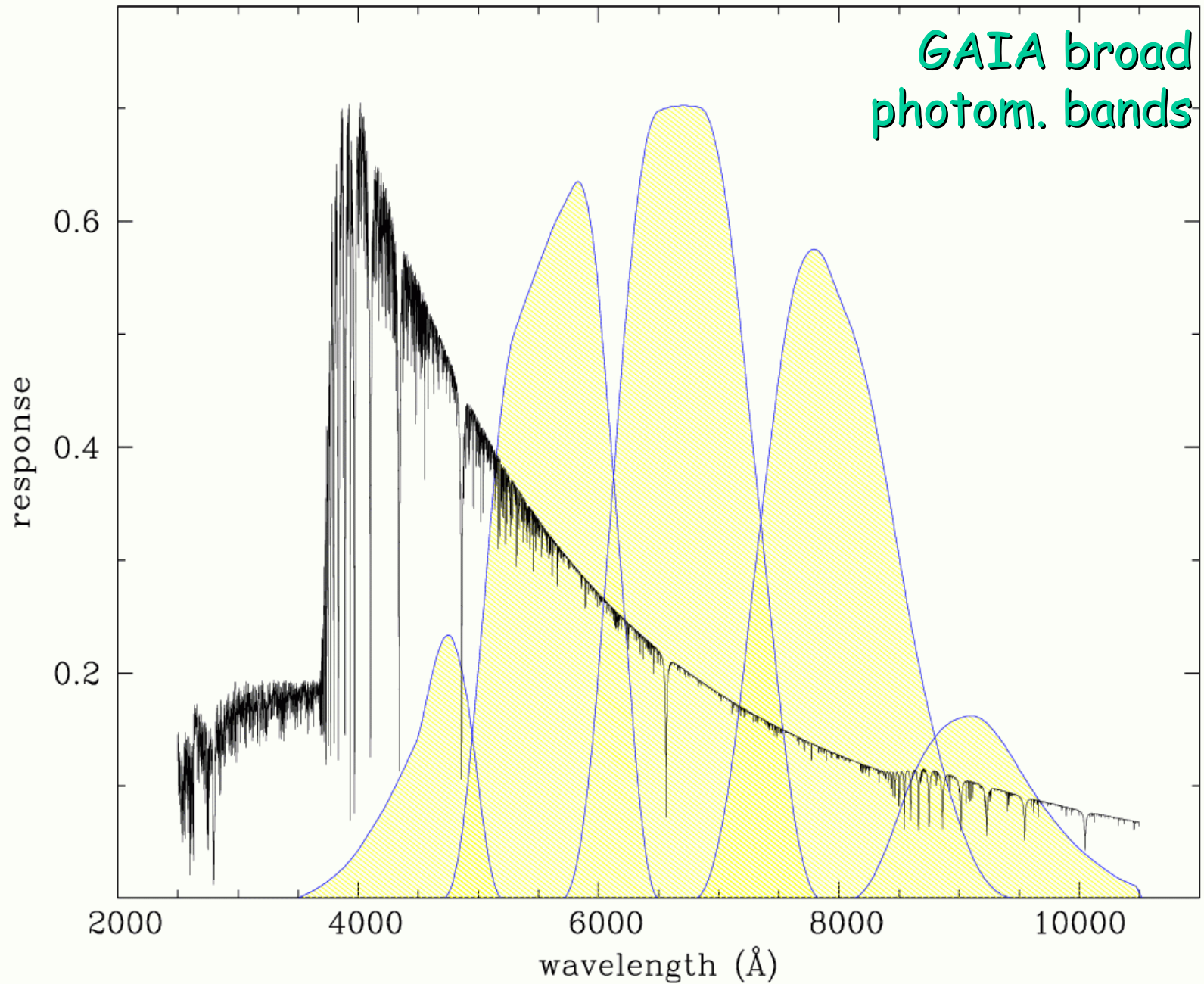
vol. 3

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*GAI*A broad  
photom. bands





# Space of Parameters

resolving powers

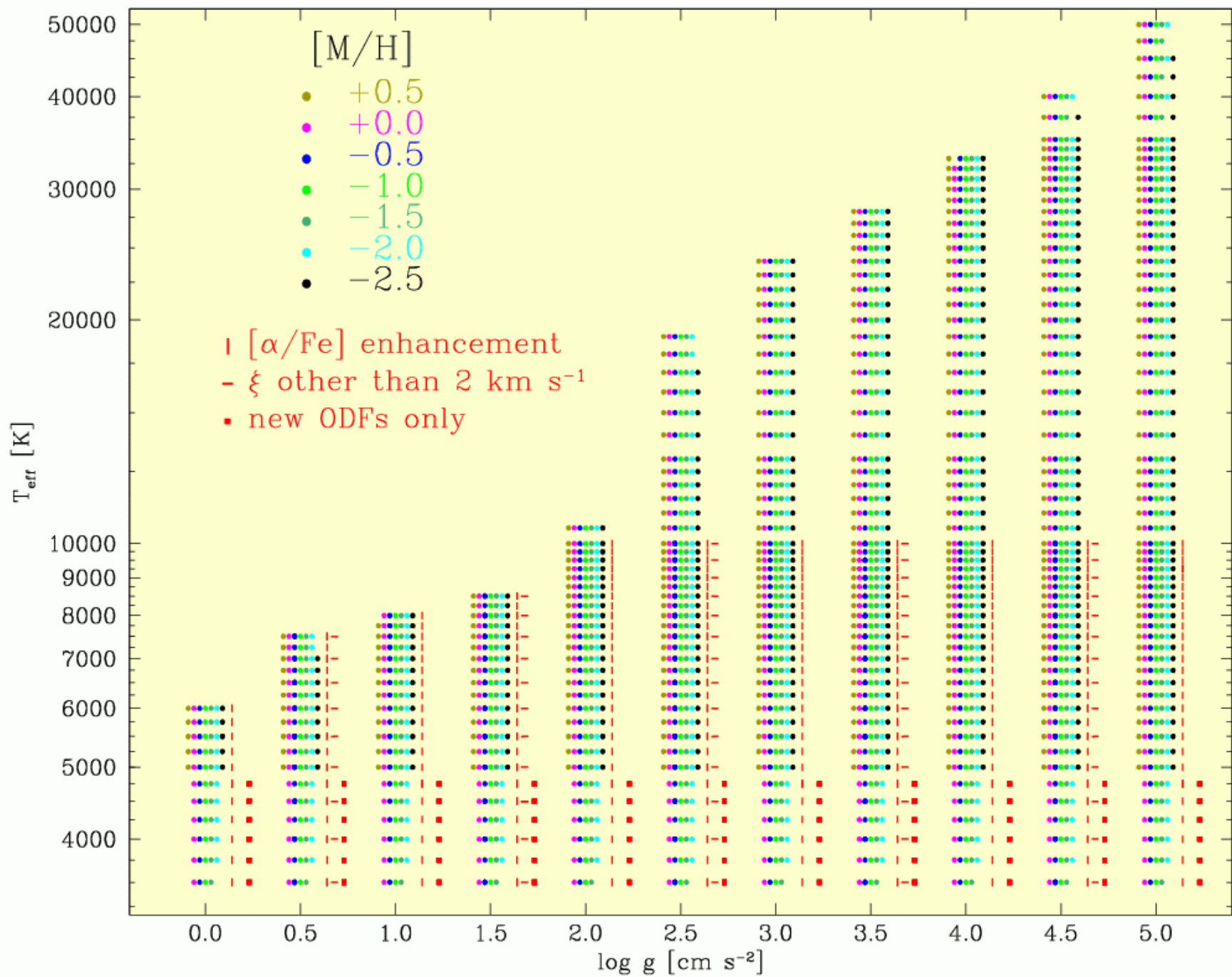
20,000 11,500  
and 2000

dispersions

1 and 10 Å/pix

from:		to:
3500	$T_{\text{eff}}(\text{K})$	50 000
0.0	$\log g$	5.0
-2.5	$[\text{Fe}/\text{H}]$	+0.5
0.0	$[\alpha/\text{Fe}]$	+0.4
1	$\xi$ (km/s)	4
0	$V_{\text{rot}}$ (km/s)	500

- $[\alpha/\text{Fe}]$  enhancement comes as two discrete values only: 0.0 or +0.4
- $\xi$  (km/s) microturbulent velocity  $\neq 2$  km/s for  $[\alpha/\text{Fe}] = +0.4$  only
- max. value of  $V_{\text{rot}}$  (km/s) rotational velocity limited to 100 km/s for  $T_{\text{eff}} < 6000$  K spectra



# File Nomenclature

temperature (K)  
gravity ( $\log g$ )  
metallicity [Fe/H]  
rotational velocity (km/s)  
microturbul. vel. (km/s)  
 $\alpha$ -enhancement  
new/old opacity distr. funct.  
overshooting/no  
resolution/dispersion  
normalized continuum

T04750G15M15V015K1ANWNVD01N.ASC

- In gravities and metallicities, decimal point omitted
- In metallicity, M="-" and P="+"
- Metallicities follow the Sun abundance ratios
- In  $\alpha$ -enhancement, A=[ $\alpha$ /Fe]=+0.4, S=[ $\alpha$ /Fe]=0.0
- New ODFs are from Castelli and Kurucz (2003)
- Overshooting in atmospheric convection on/off (Castelli, Gratton, Kurucz 1997)
- Resolutions: 20,000 2,000 Dispersions: 1, 10 Ang/pix
- Continuum normalized to unity or fluxed

## data distribution:

- via ESA web-page (thanks to Salim Ansari)
- via Asiago web-page
- with a set of DVDs in special, limited cases
- (via CDS)



# GAIA photometric system

