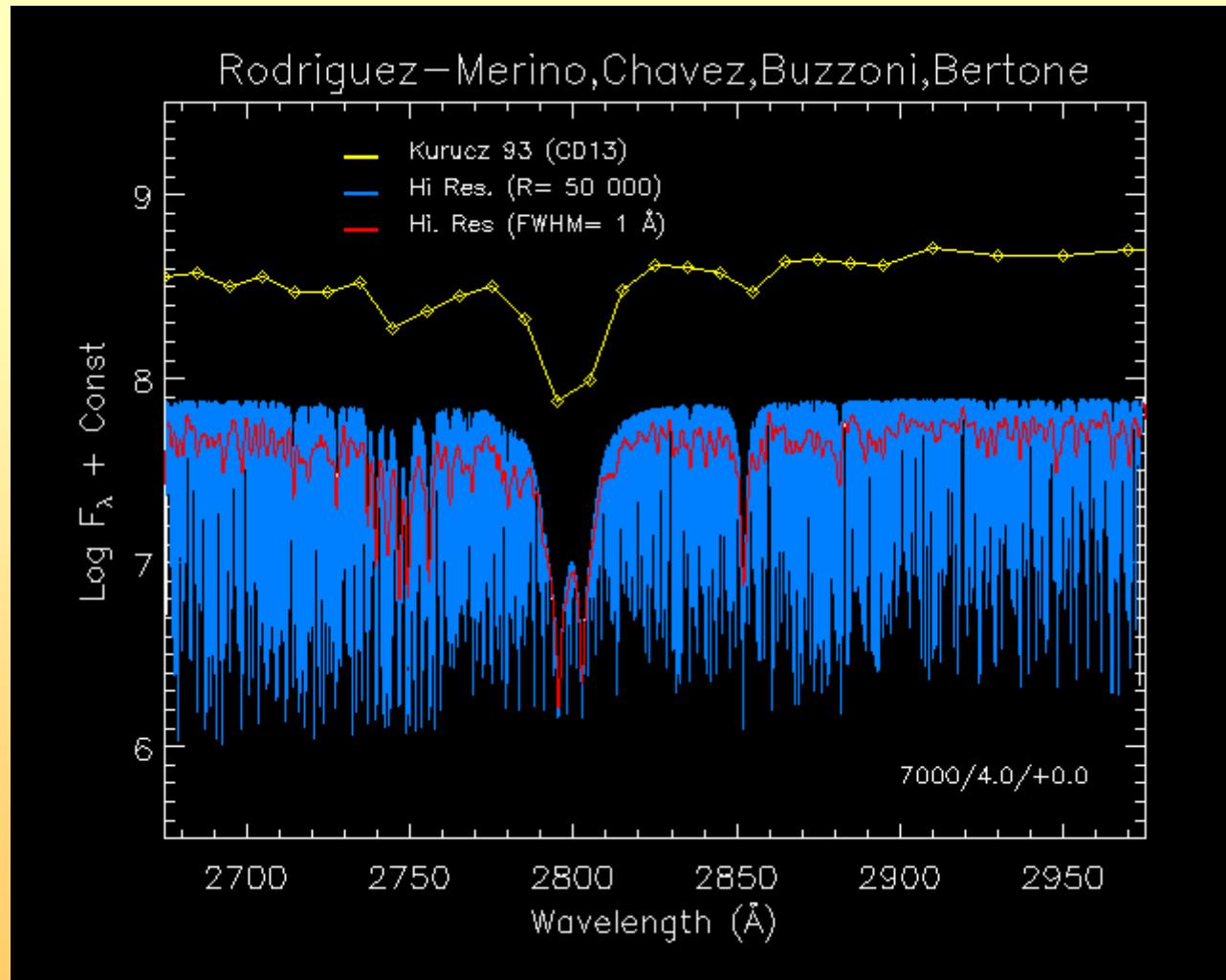


Unconventional views of stellar populations

Part III
Open questions in high-resolution
spectral synthesis

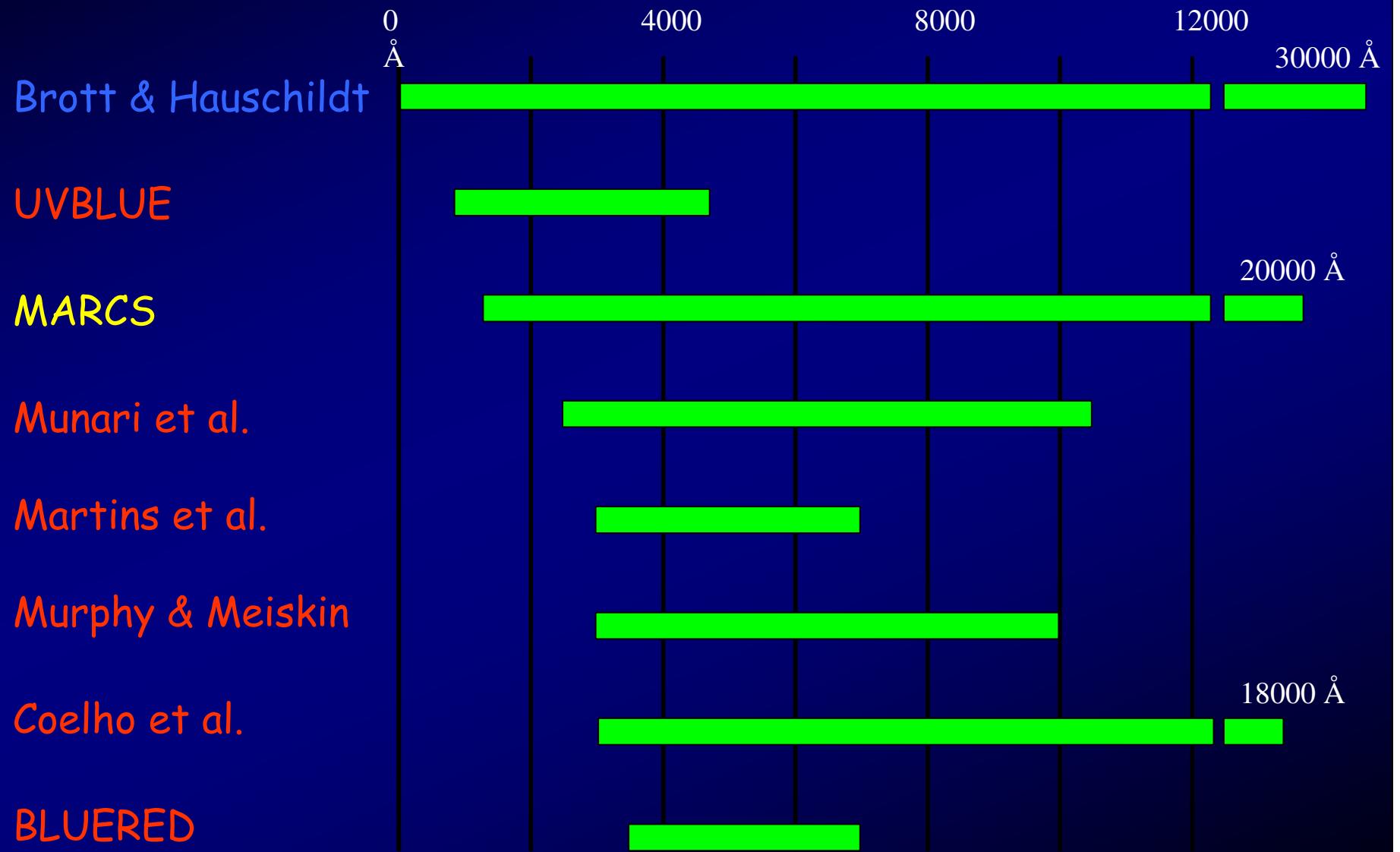
Alberto Buzzoni
INAF - Oss. Astronomico di Bologna, Italy

Toward high-resolution synthesis



Rodriguez-Merino et al. (2005)

Stellar libraries of high-res synthetic spectra



"Optical structure"

+

Synthetic spectrum

=

Model atmosphere

Library	Model Atmospheres	Spectrum Synthesis Codes
Brott	PHOENIX	PHOENIX
UVBLUE	ATLAS9 (old)	SYNTHE
MARCS	MARCS	MARCS
Munari	ATLAS9 (new)	SYNTHE
Coelho	ATLAS9 (new)	FANTOM
Martins	PHOENIX/ ATLAS9 (old)/ TLUSTY	PHOENIX/ SPECTRUM/ SYNSPEC
BLUERED	ATLAS9 (old)	SYNTHE

Brott & Hauschildt

UVBLUE

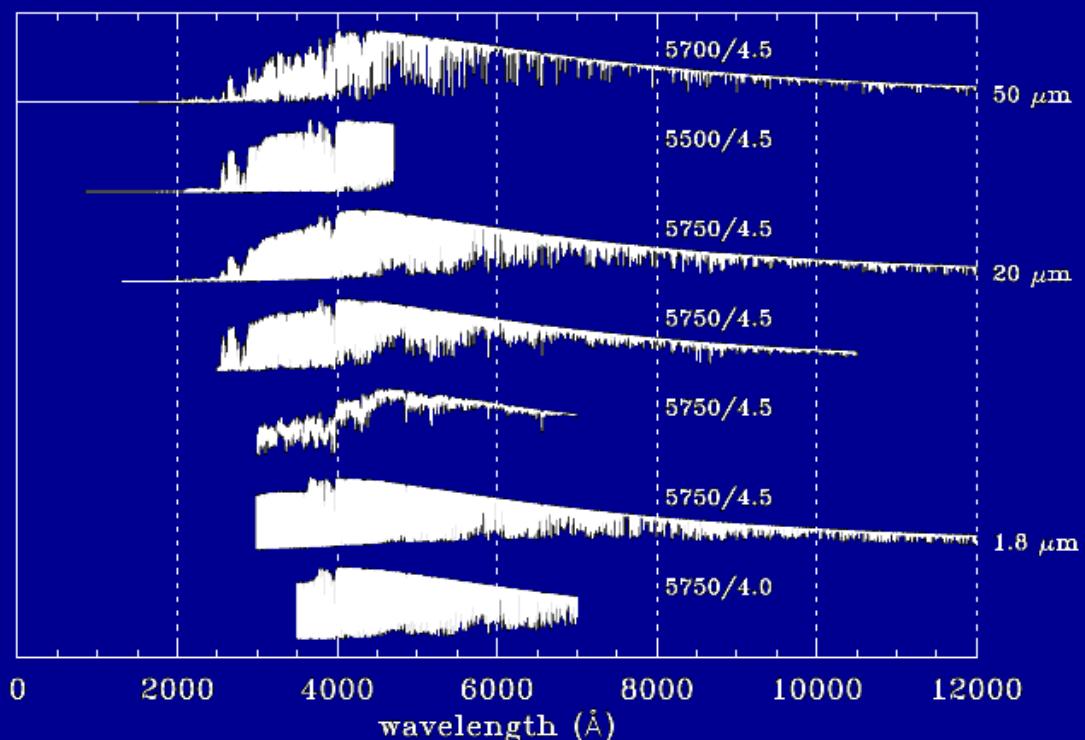
MARCS

Munari et al.

Martins et al.

Coelho et al.

BLUERED



The synthetic high-resolution library

UV- Blue

λ interval	$850 \rightarrow 4750 \text{ \AA}$
R =	50 000
Step	$0.017 \rightarrow 0.095 \text{ \AA}$
T_{eff}	$3000 \rightarrow 50\,000 \text{ K}$
log g	$0.0 \rightarrow 5.0 \text{ dex}$
[M/H]	$-2.0 \rightarrow +0.5$
No. spectra	1690

BLUERED

	$3500 \rightarrow 7000 \text{ \AA}$
	500 000
	$0.007 \rightarrow 0.014 \text{ \AA}$
	$4000 \rightarrow 50\,000 \text{ K}$
	$0.0 \rightarrow 5.0 \text{ dex}$
	$-3.0 \rightarrow +0.3$
	832

Rodríguez-Merino et al. 2005

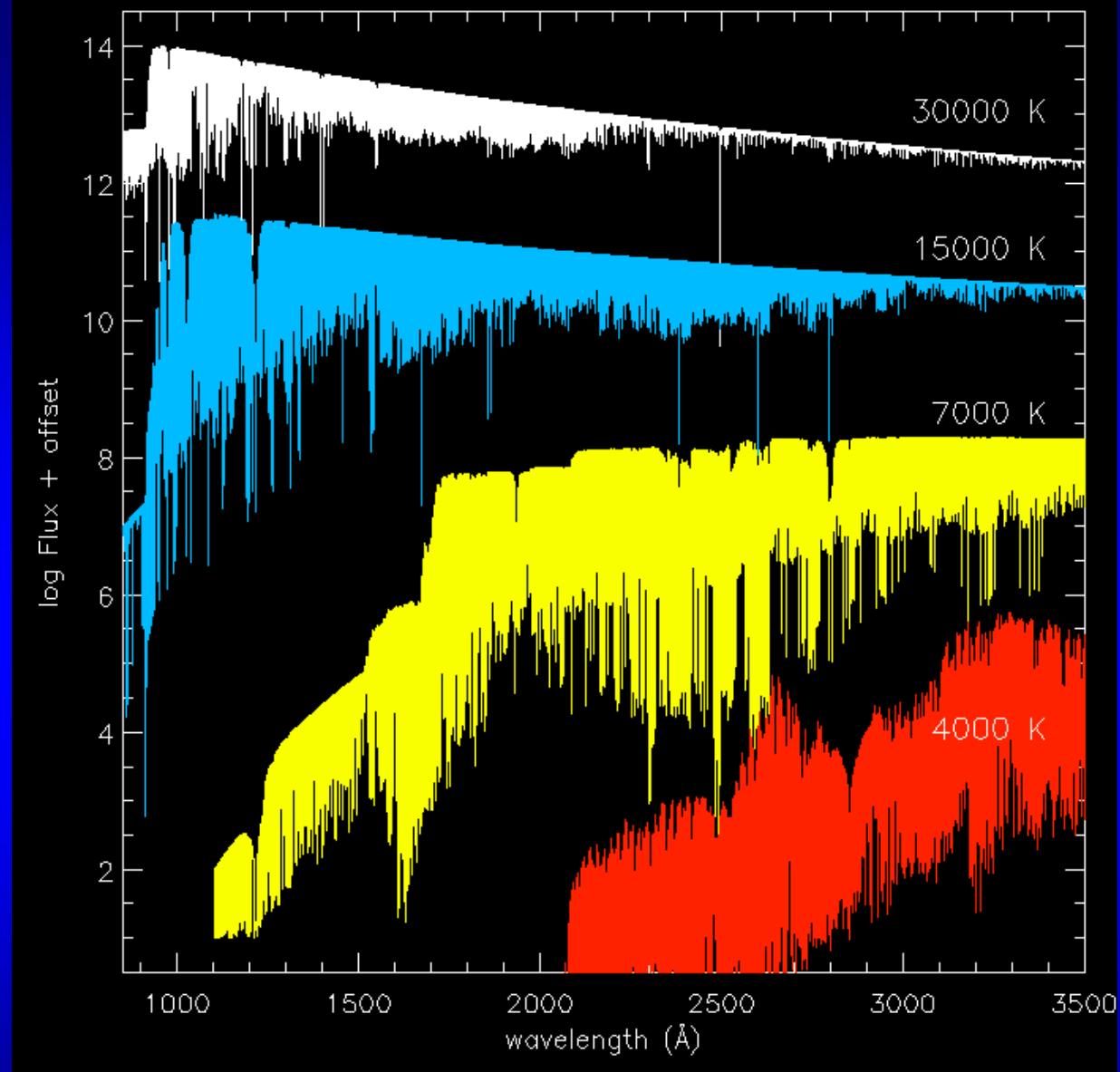
Bertone et al. 2008

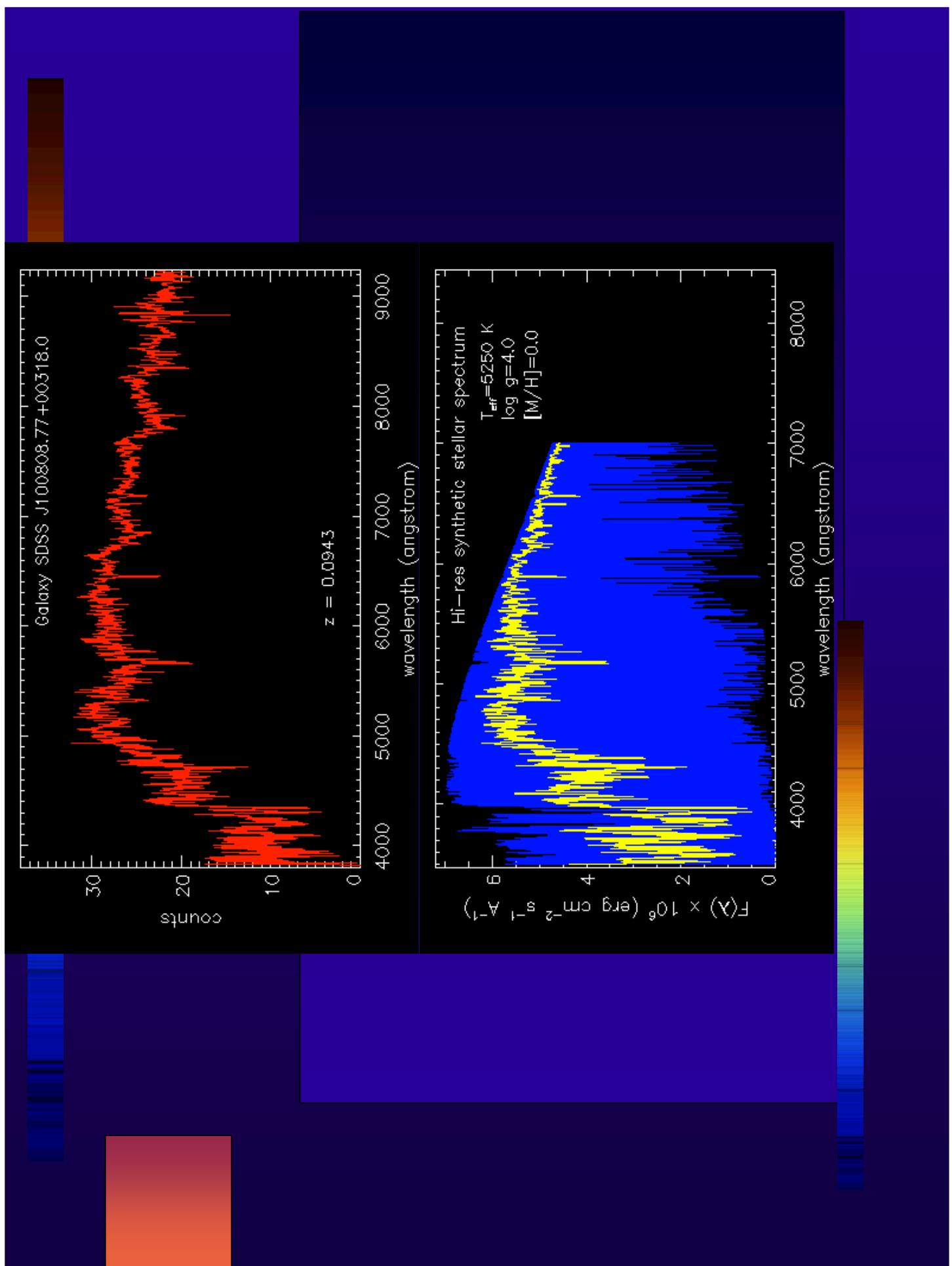
Kurucz ATLAS9 model atmospheres

1. plane-parallel geometry;
2. steady state;
3. constant energy flux (radiative+convective);
4. hydrostatic equilibrium;
5. LTE;
6. homogeneous chemical composition;
7. 72 depth points;
8. 58 million absorption lines (ODF);
9. diatomic molecules.

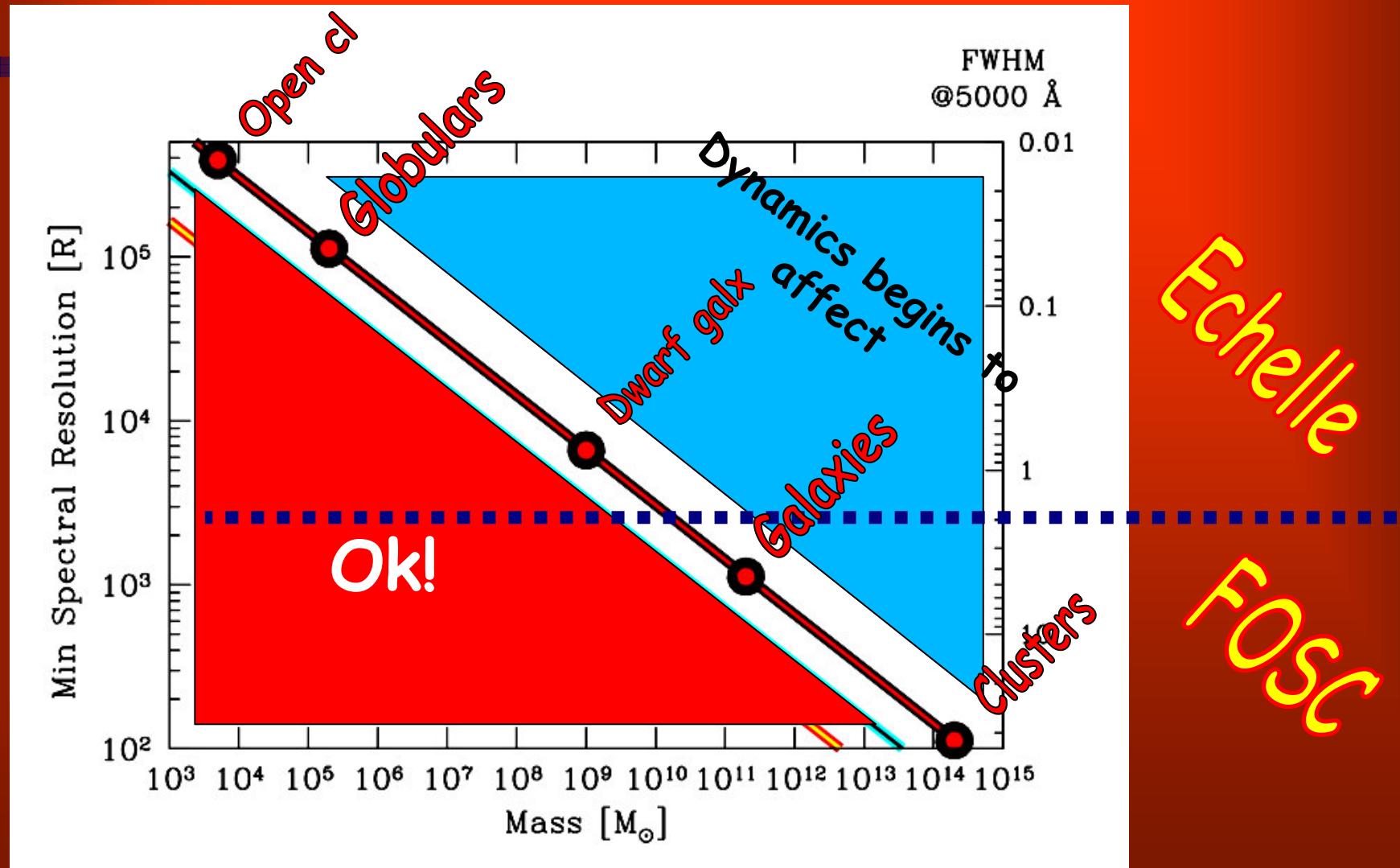
Codes : ATLAS and SYNTHE

UV-Blue library

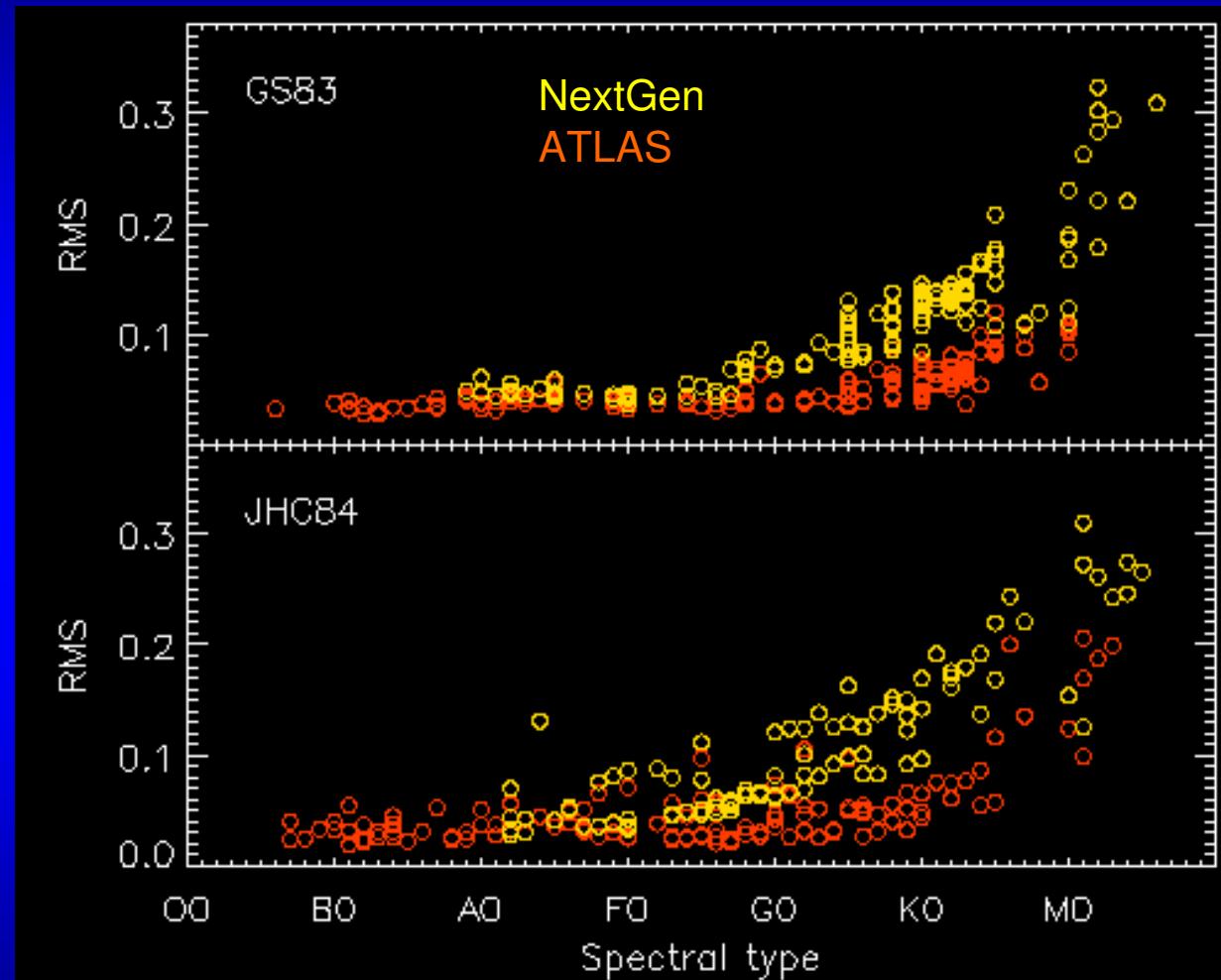




High-res = more info?

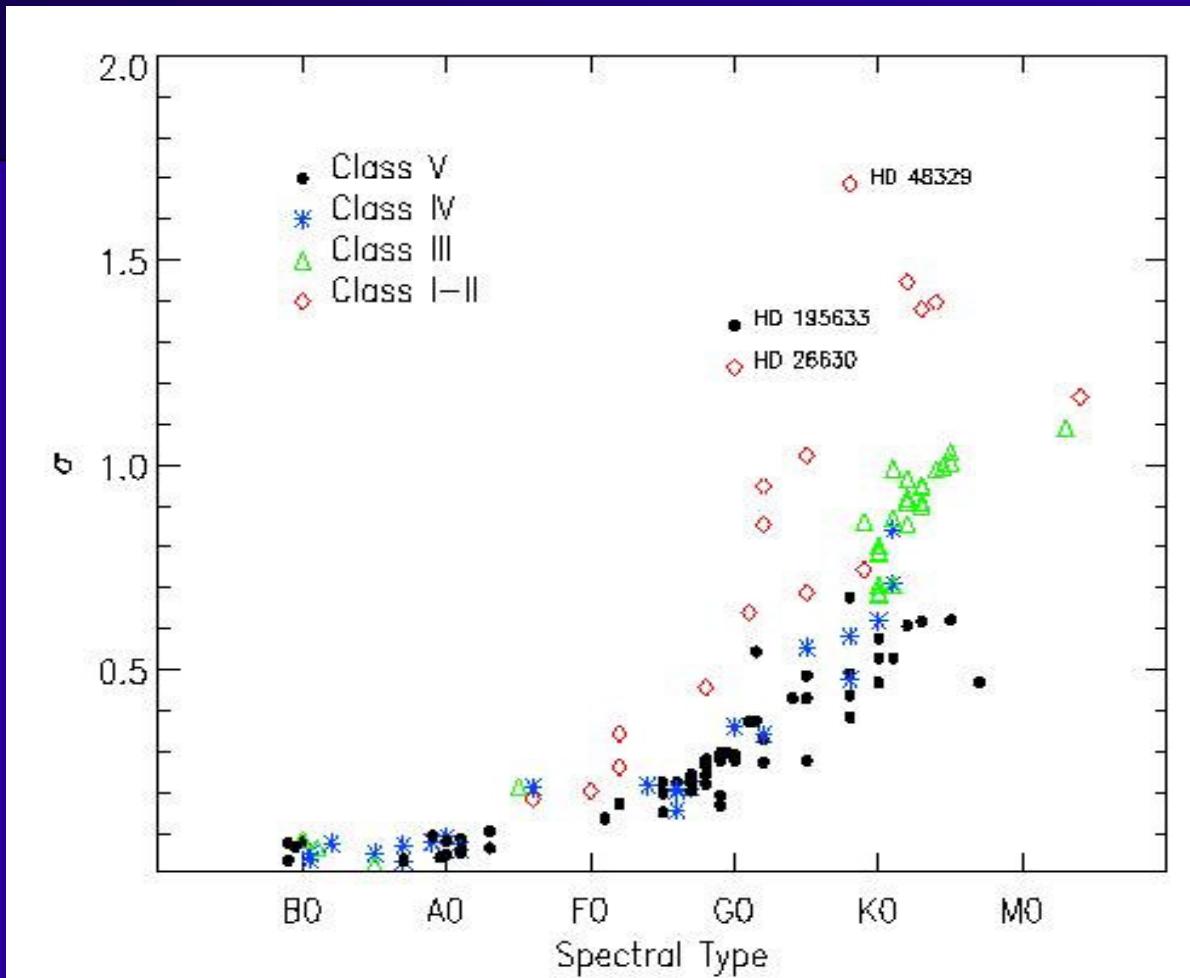


ATLAS vs. NextGen



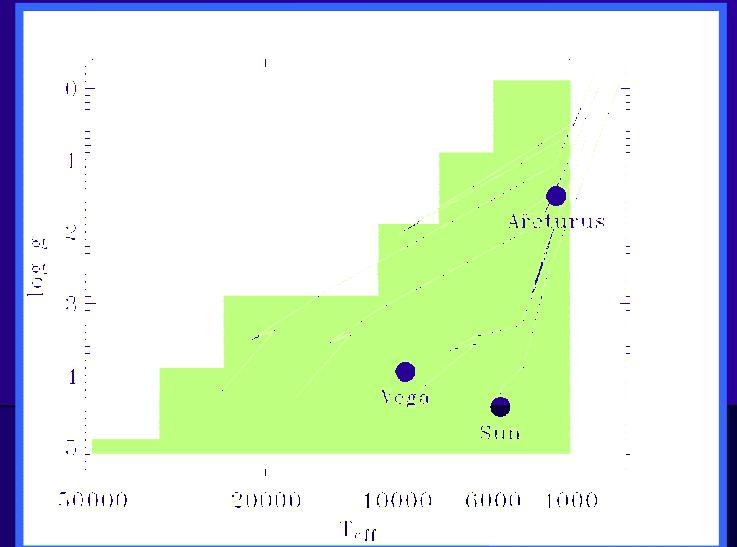
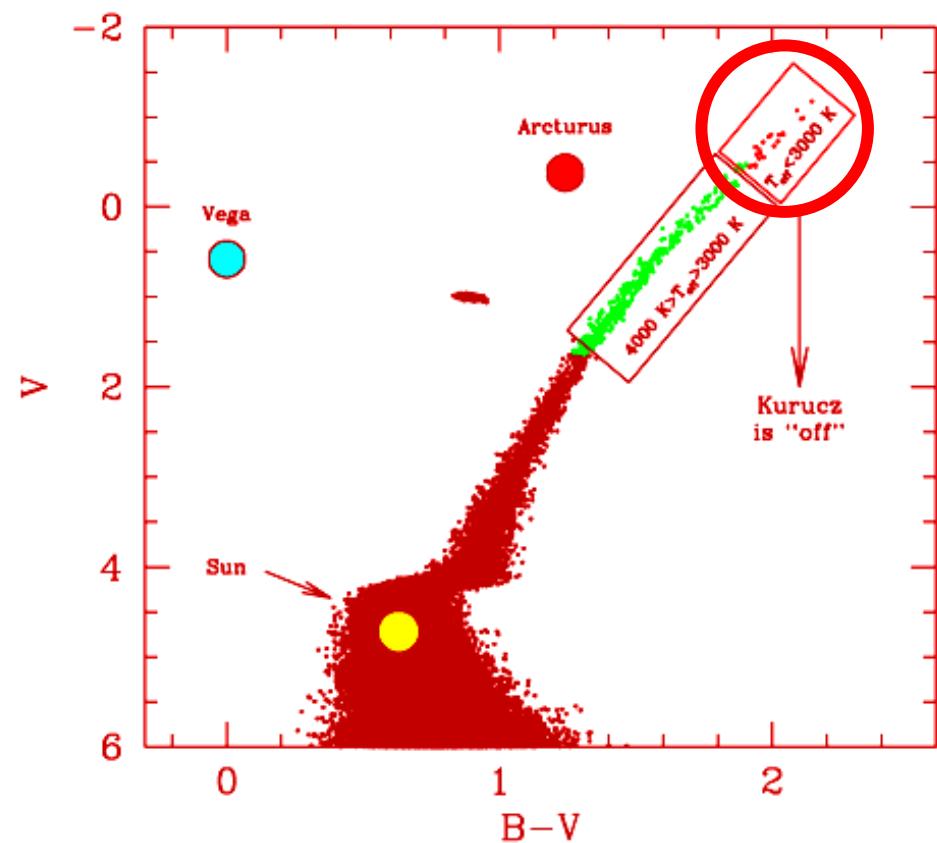
Bertone et al. (2004)

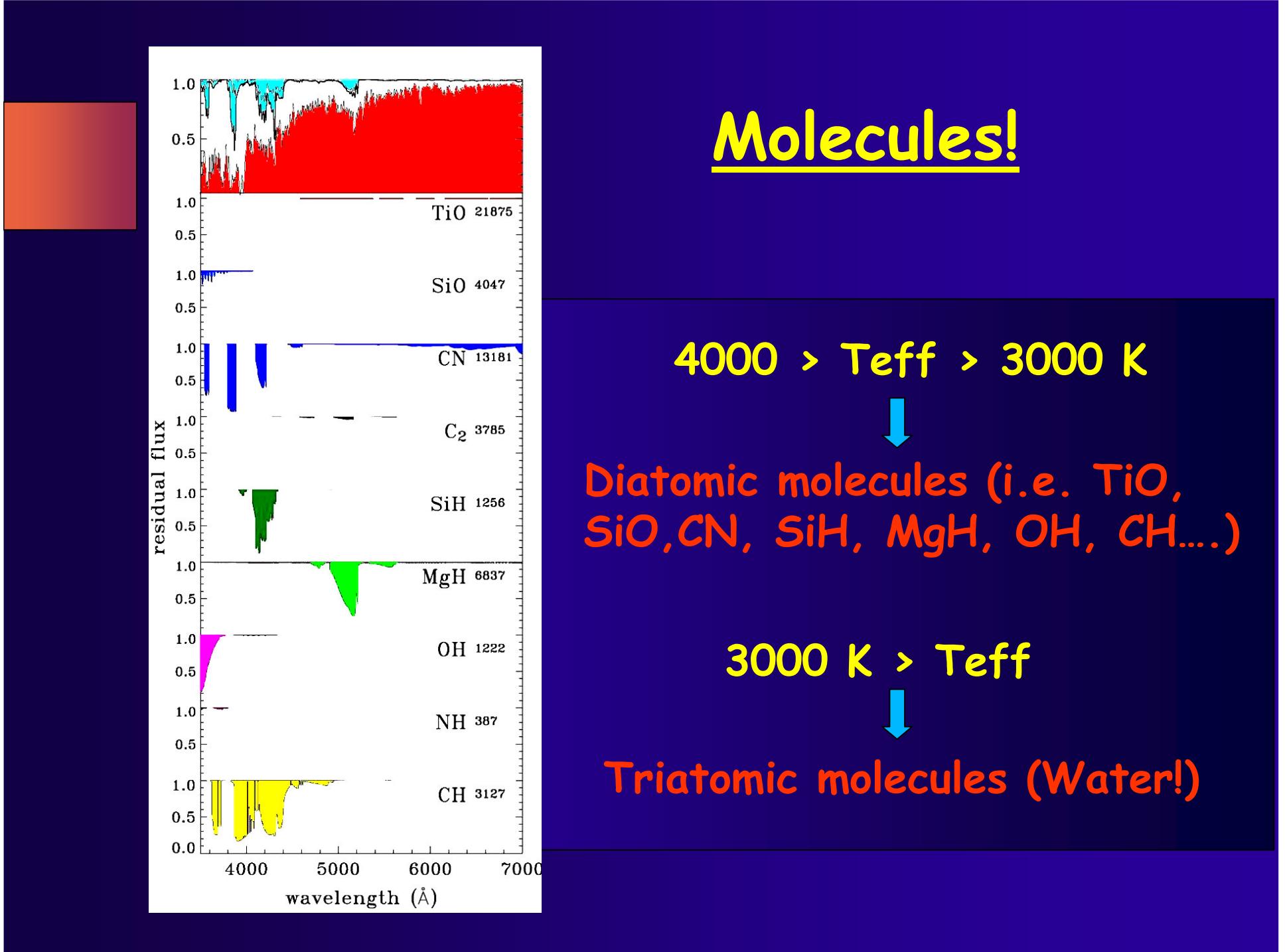
Fitting the Ultraviolet

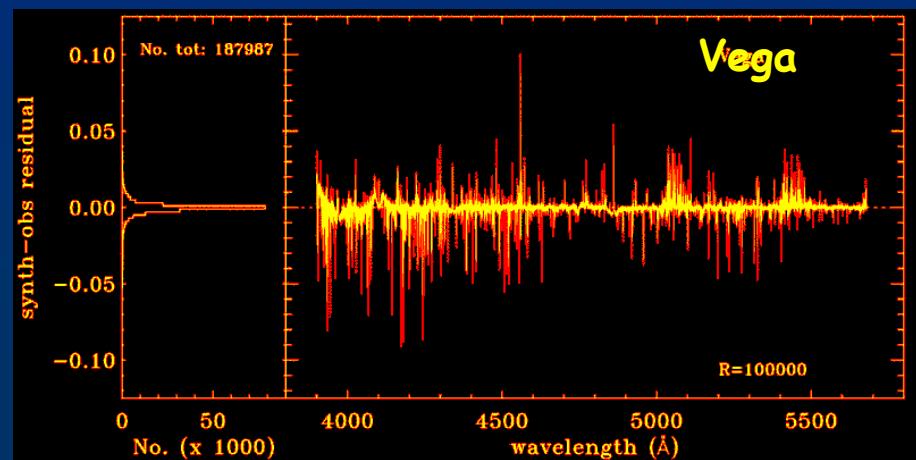
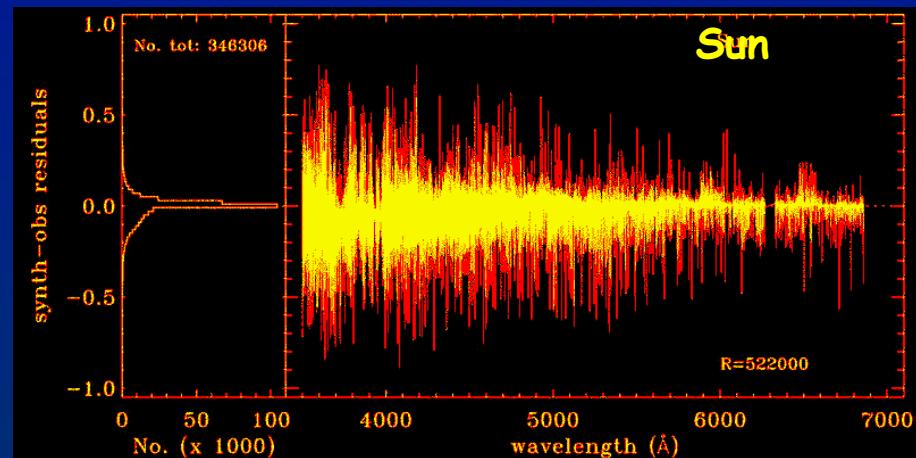
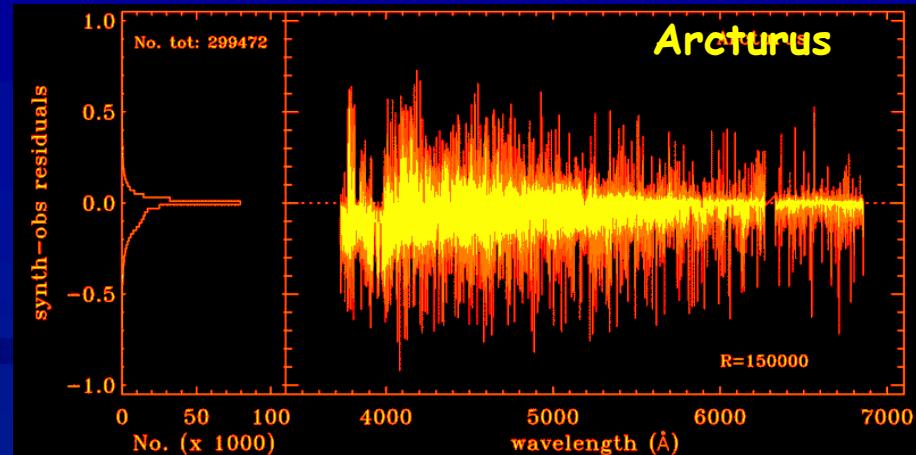


Rodriguez-Merino et al. (2005)

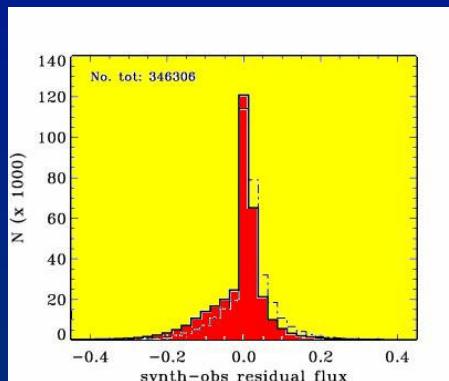
Toward cooler temperatures







Template validation



skewness

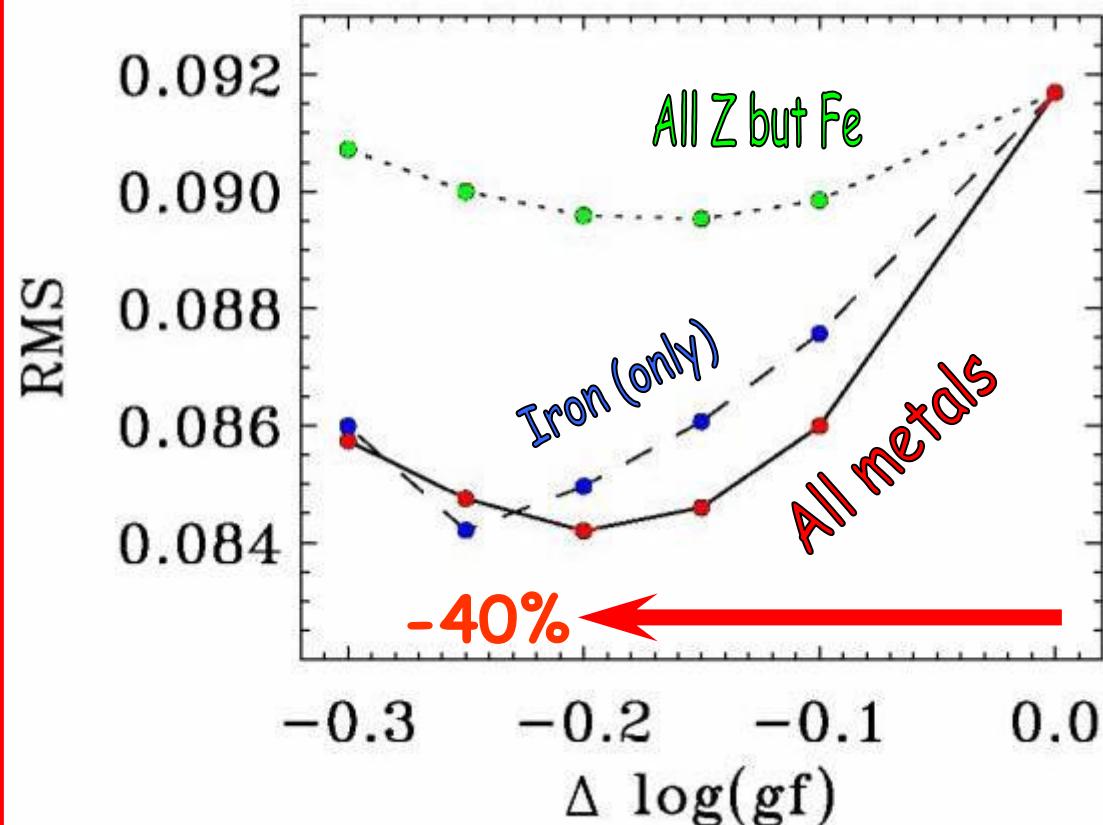
Arcturus	-0.67
Sun	-1.04
Vega	-2.21

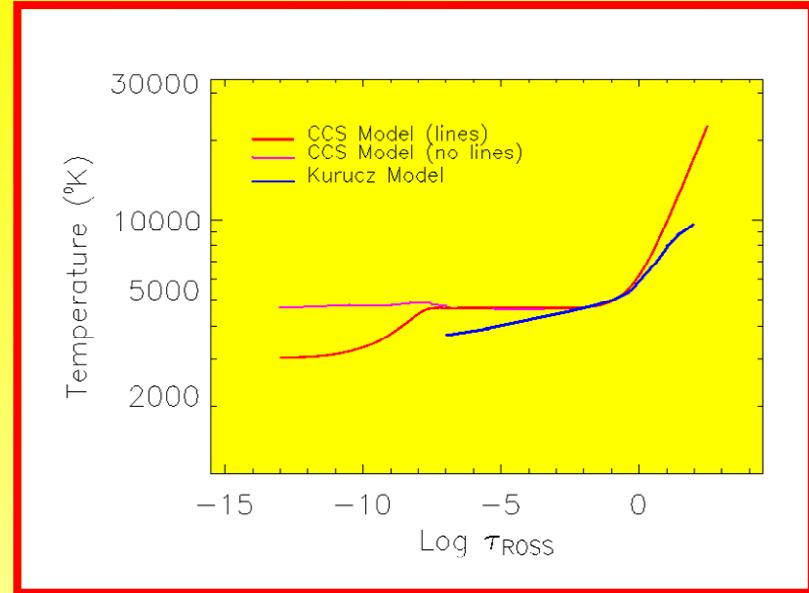
$\sigma(\text{flux})$

R = 520k 150k 100k

Arcturus	...	0.108	0.056
Sun	0.092	0.079	0.045
Vega	0.007

Lower Oscillator Strengths?

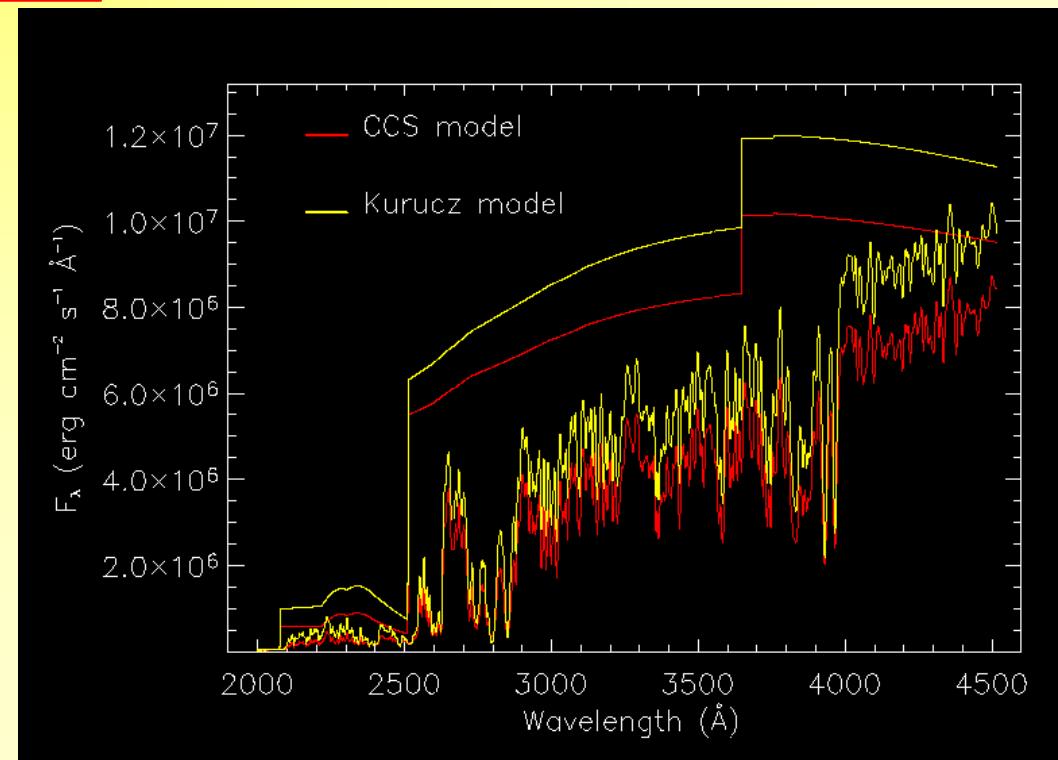




Solar troubles

Cardona et al. (2002)

Rodriguez-Merino et al. (2008)



The End (Part III)