New Constraints on Stellar Parameters Inferred from Joint Modeling of Spectra & SEDs

Phillip Cargile

Know thy Star — Know thy Planet
2017

Charlie Conroy

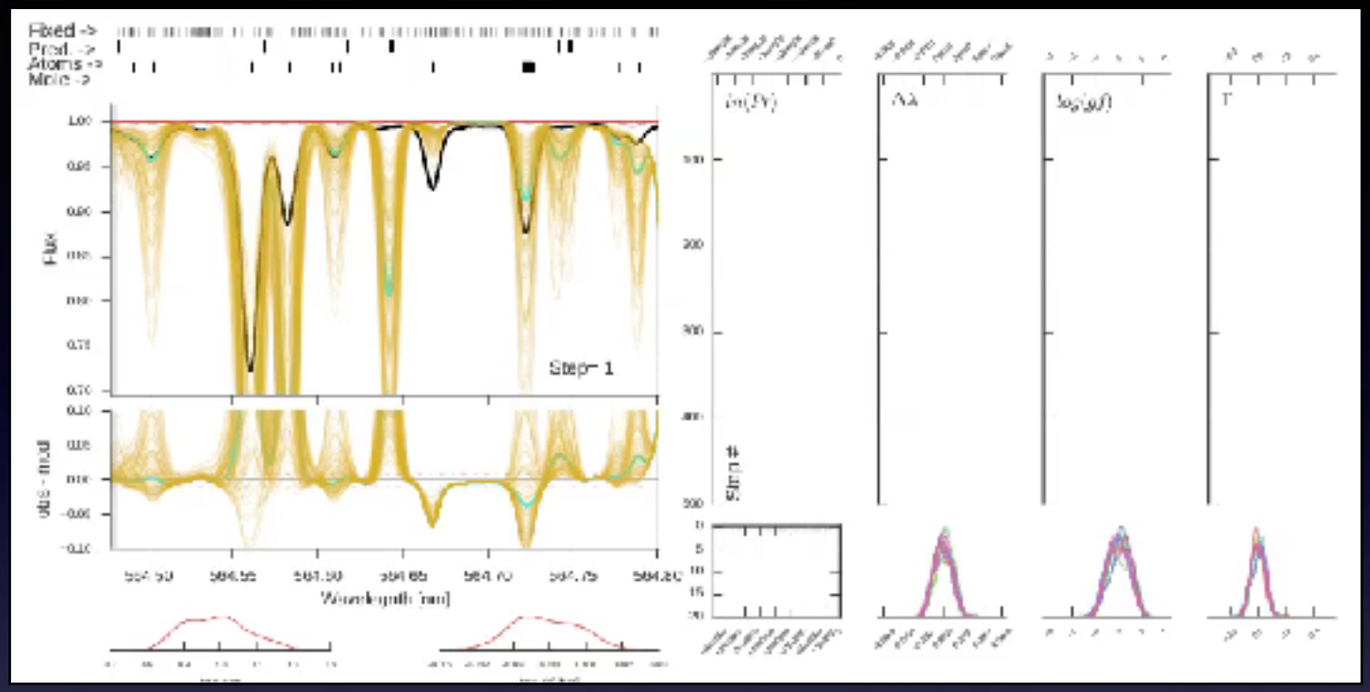
Robert Kurucz

Aaron Dotter

Ben Johnson

Yuan-Sen Ting

Jieun Choi



- All lines currently in Kurucz line archive
- Model 3 quantum parameters
- Simultaneous fit of Sun + Arcturus
- Full posteriors and marginalized errors
- Cargile, Conroy, & Kurucz (in prep)

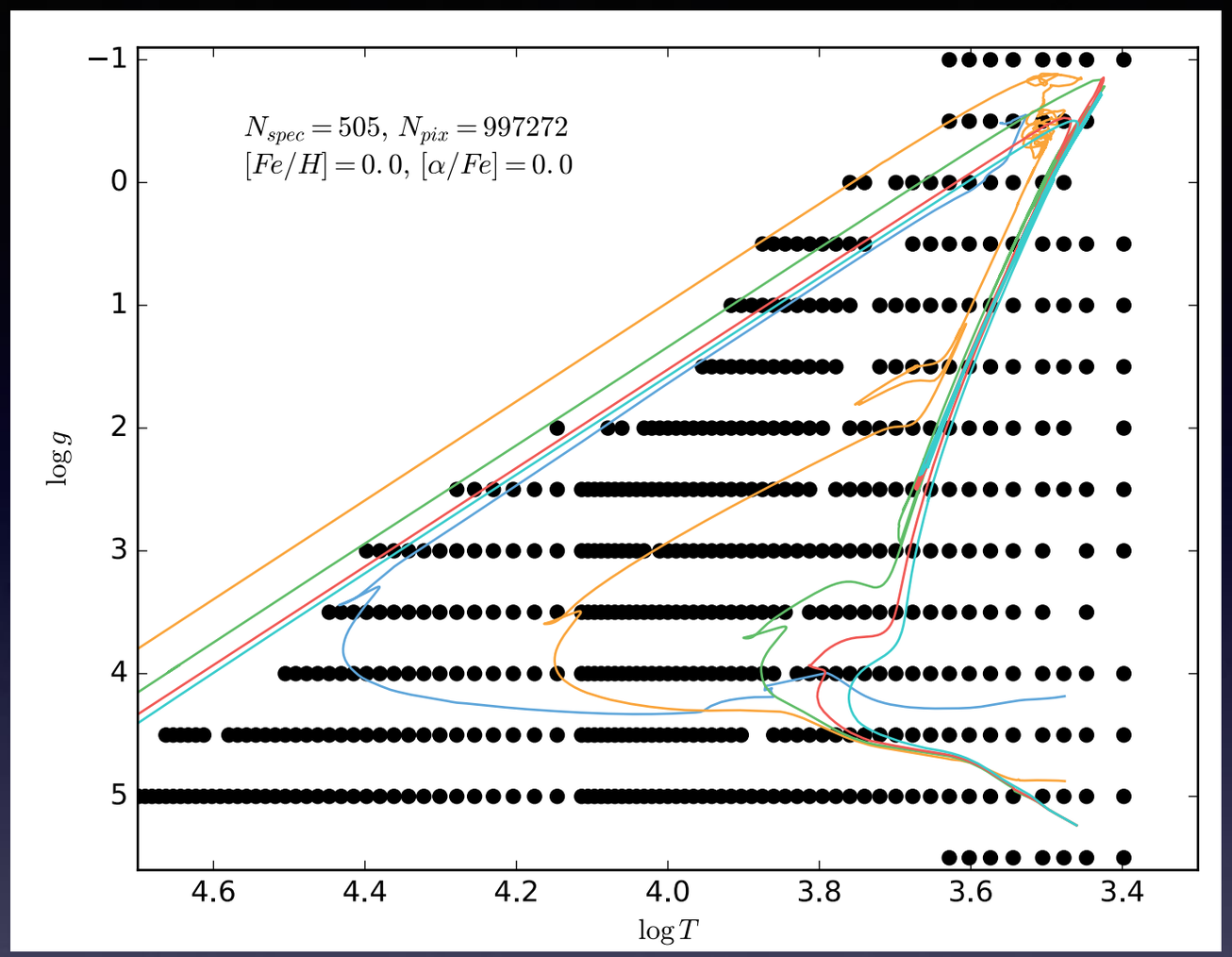
Fitting All the Lines [FAL]

- Charlie Conroy, Robert Kurucz
- Calibrating Atom. & Mol. Lines
- +60K Lines in Optical & H-band

C3K Spectral Grid

- Charlie Conroy, Fiorella Castelli, Robert Kurucz, Yuan-Sen Ting
- Update to Castelli & Kurucz grid
- Denser, more expansive, [a/Fe]

MIST



- FAL line
- ATLAS-12 / SYNTHE
- Improved physics (solar-abundance/opacities/etc)
- [Fe/H] = -4.0 to +0.75, [a/Fe] = -0.2 to +0.6
- Conroy, Cargile, Castelli & Kurucz (in prep)

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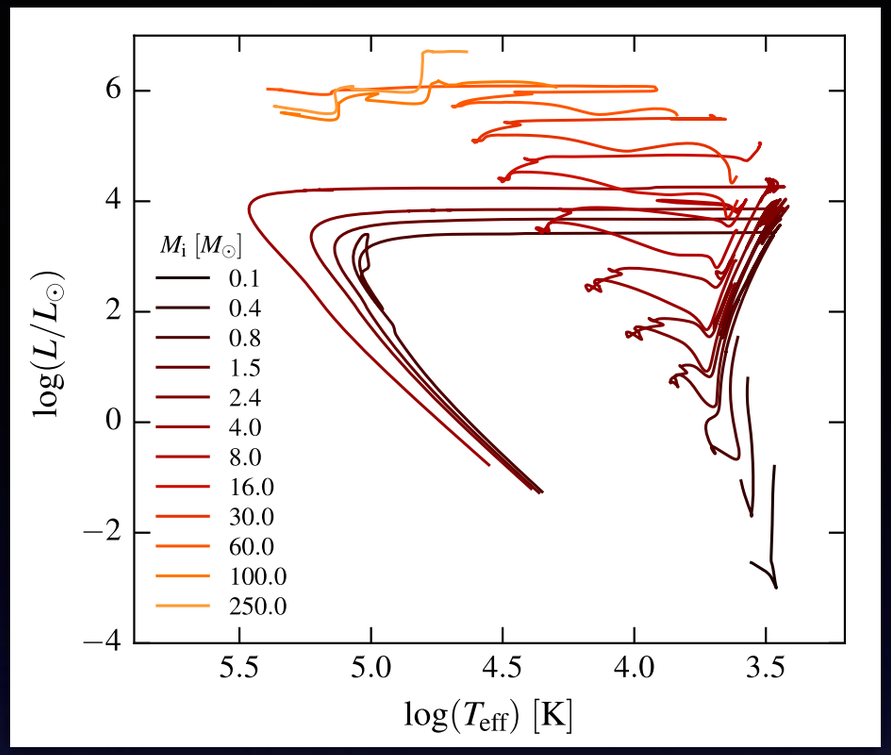

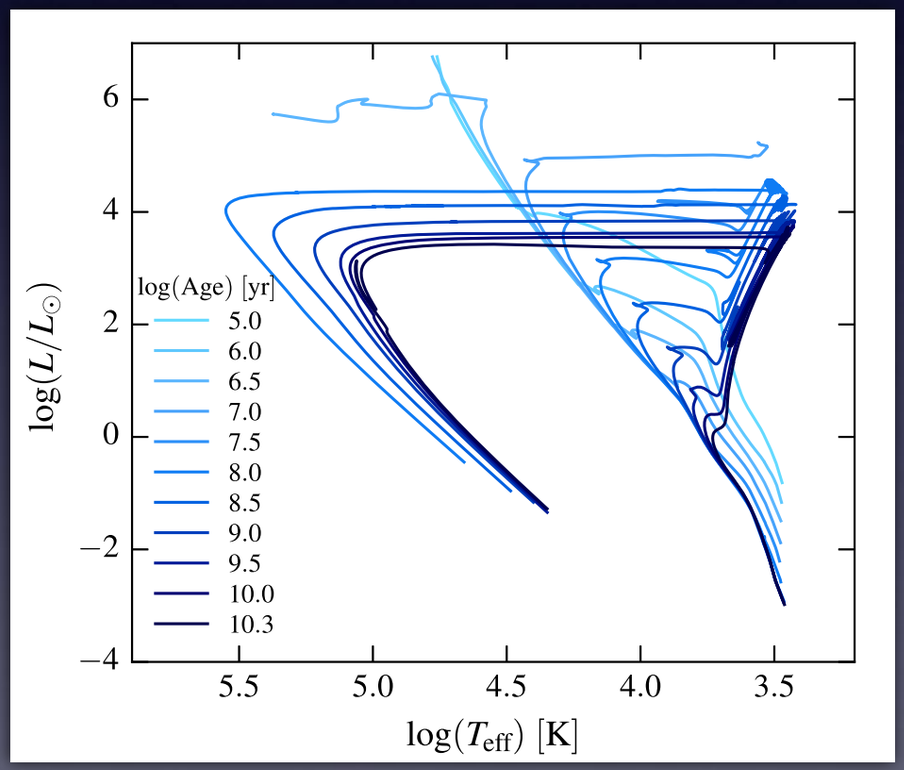

- MESA
- C3K boundary conditions
- Improved physics (solar-abundance/opacities/etc)
- Dotter (2016), Choi et al. (2016)
- Look for MIST V2.0 this winter

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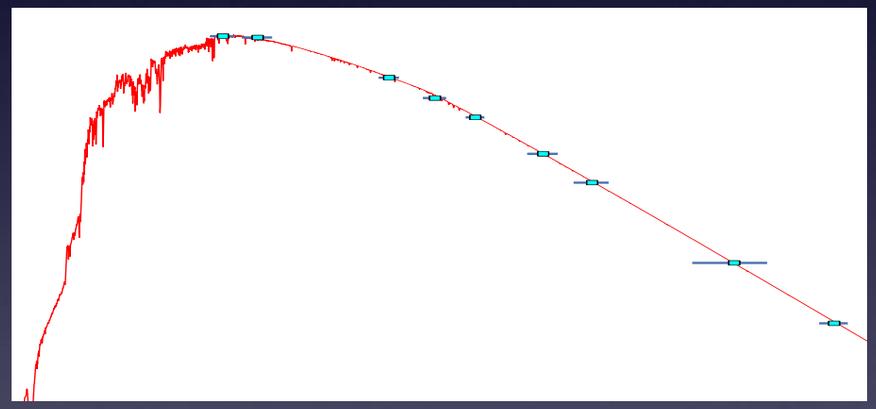
MIST

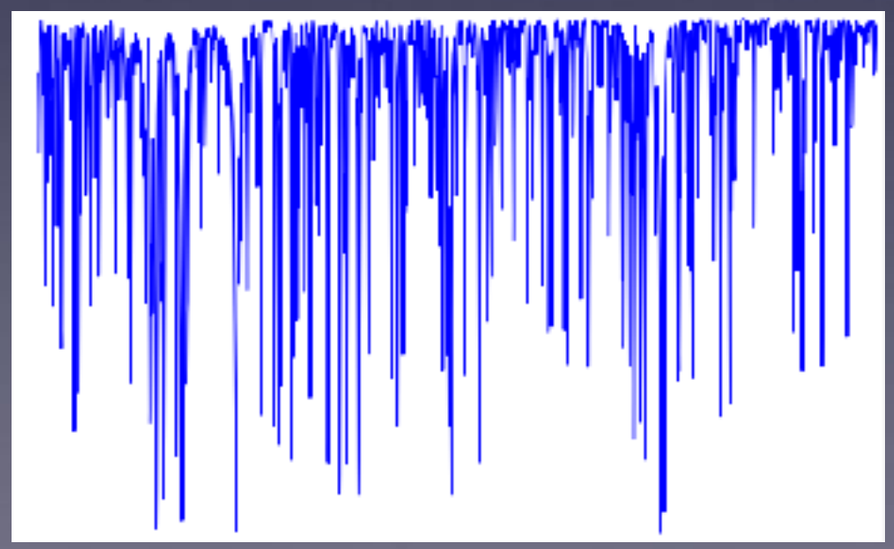
The Payne

Yuan-Sen Ting, Charlie Conroy, Ben Johnson

Cecilia Payne-Gaposchkin

Labels
(Teff, log(g), [Fe/H], etc.)





C3K Grid

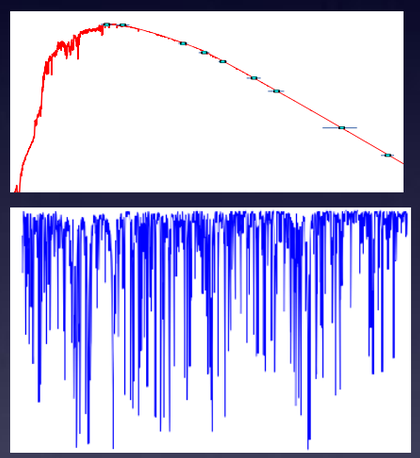
The Payne

Yuan-Sen Ting, Charlie Conroy, Ben Johnson

Cecilia Payne-Gaposchkin

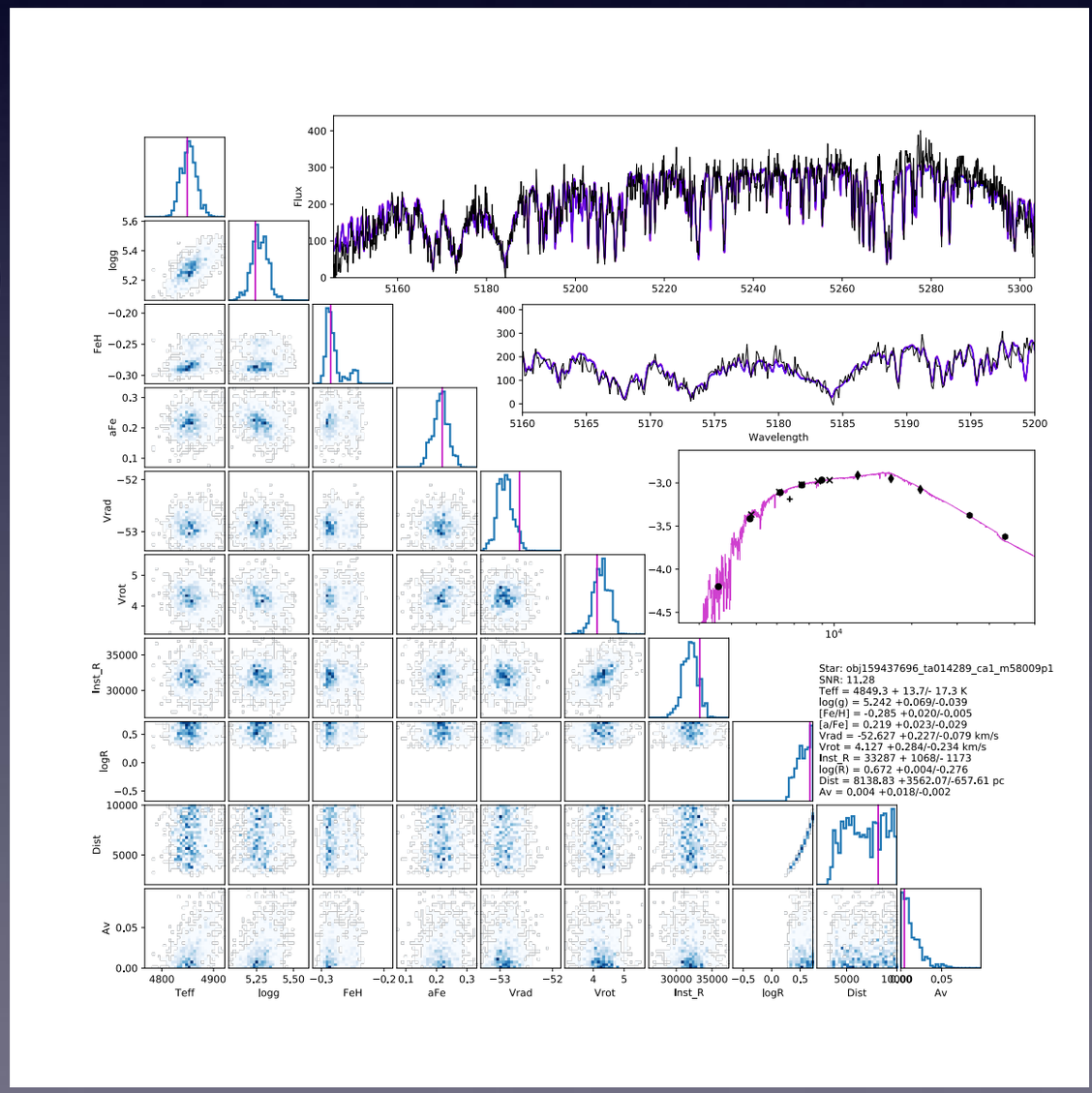
Observed Data:

- Low-/High-Res Spectra
- Photometry
- Priors: ex., Gaia Distance



Dynesty

Josh Speagle, Ben Johnson



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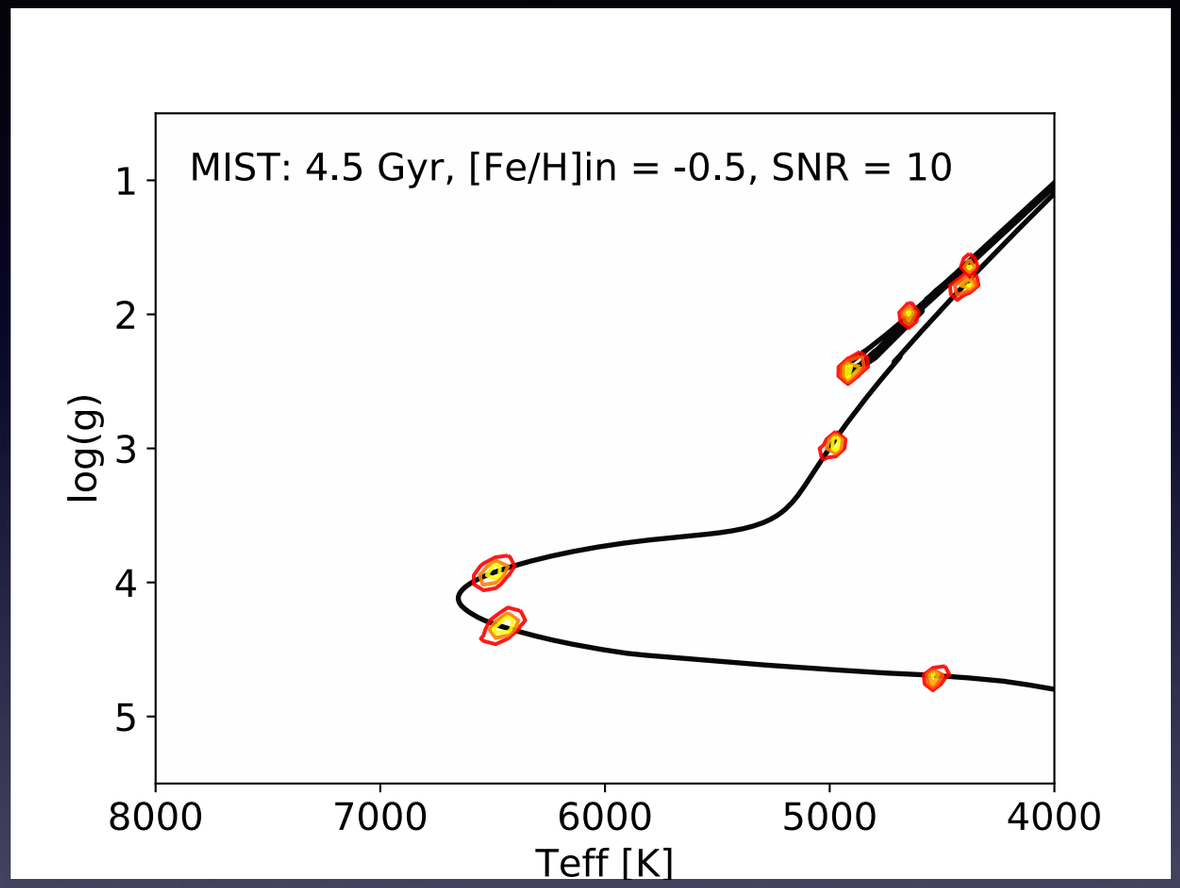
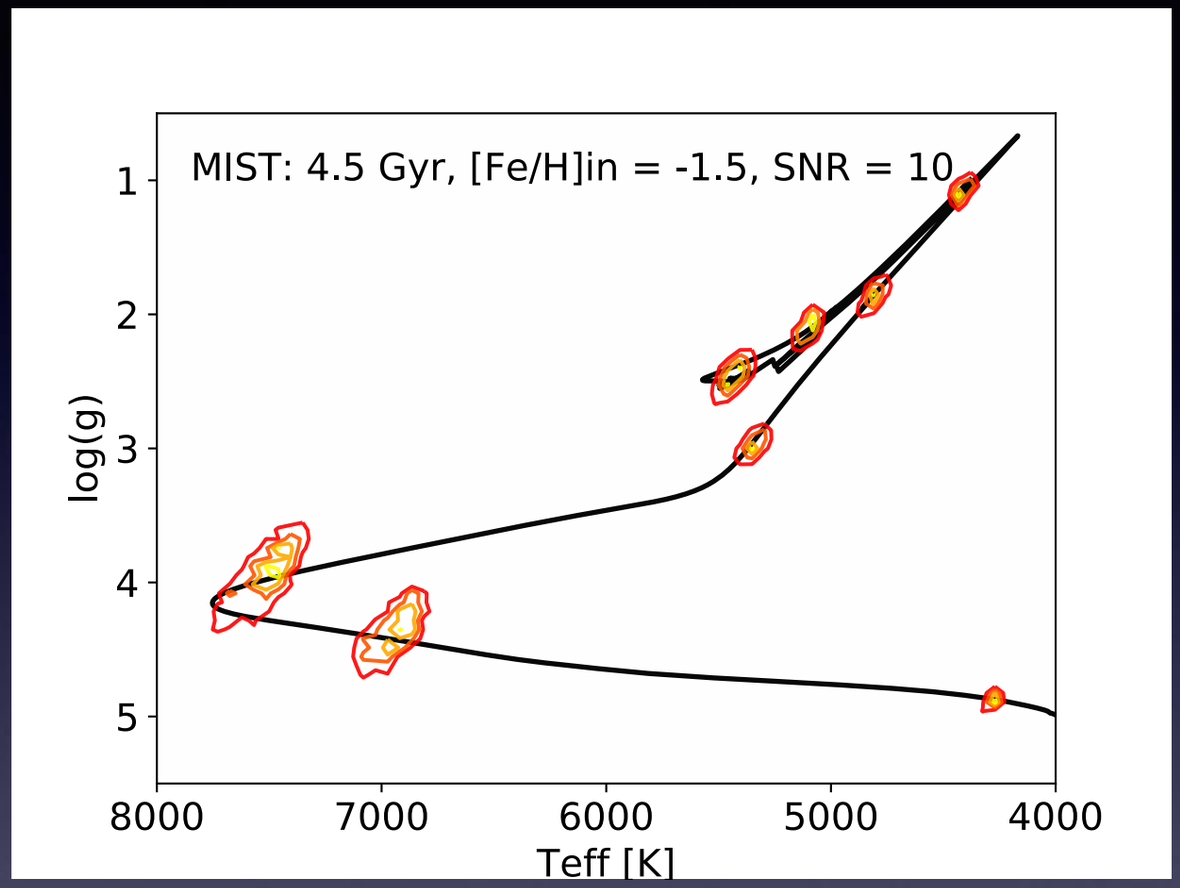
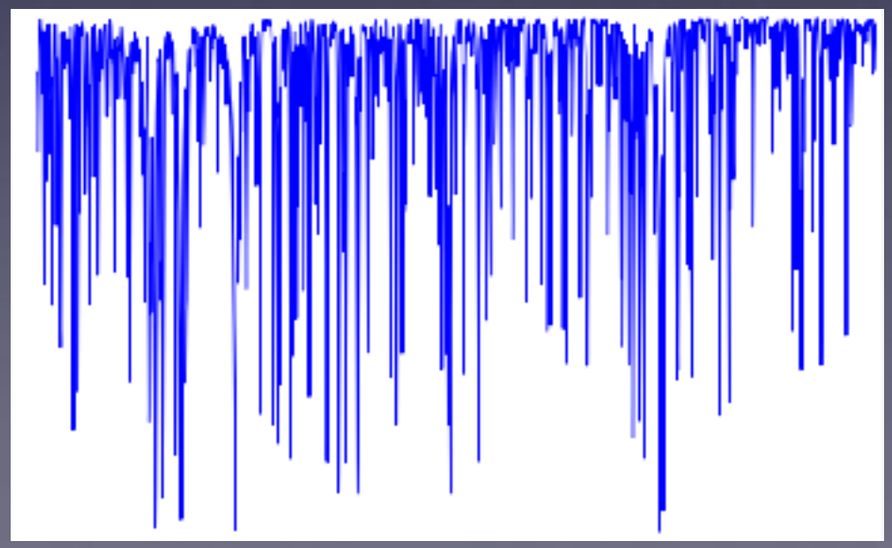
Mock Test:
H3 spectra: Hectochelle — RV31
Phot: SDSS+PanSTARRS+2MASS+WISE







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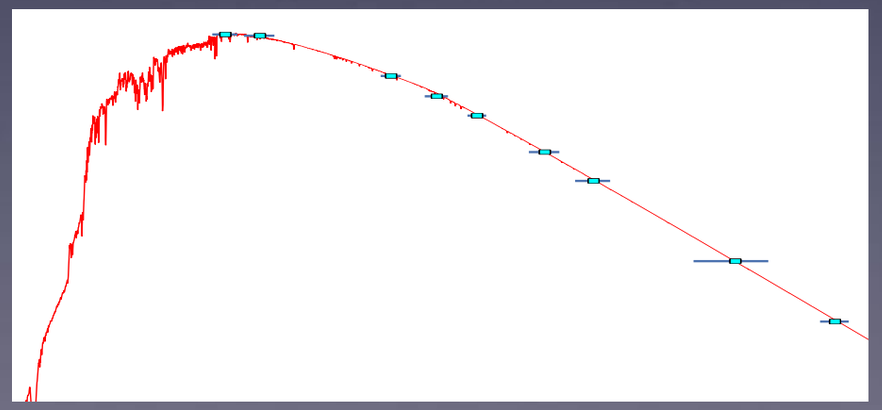

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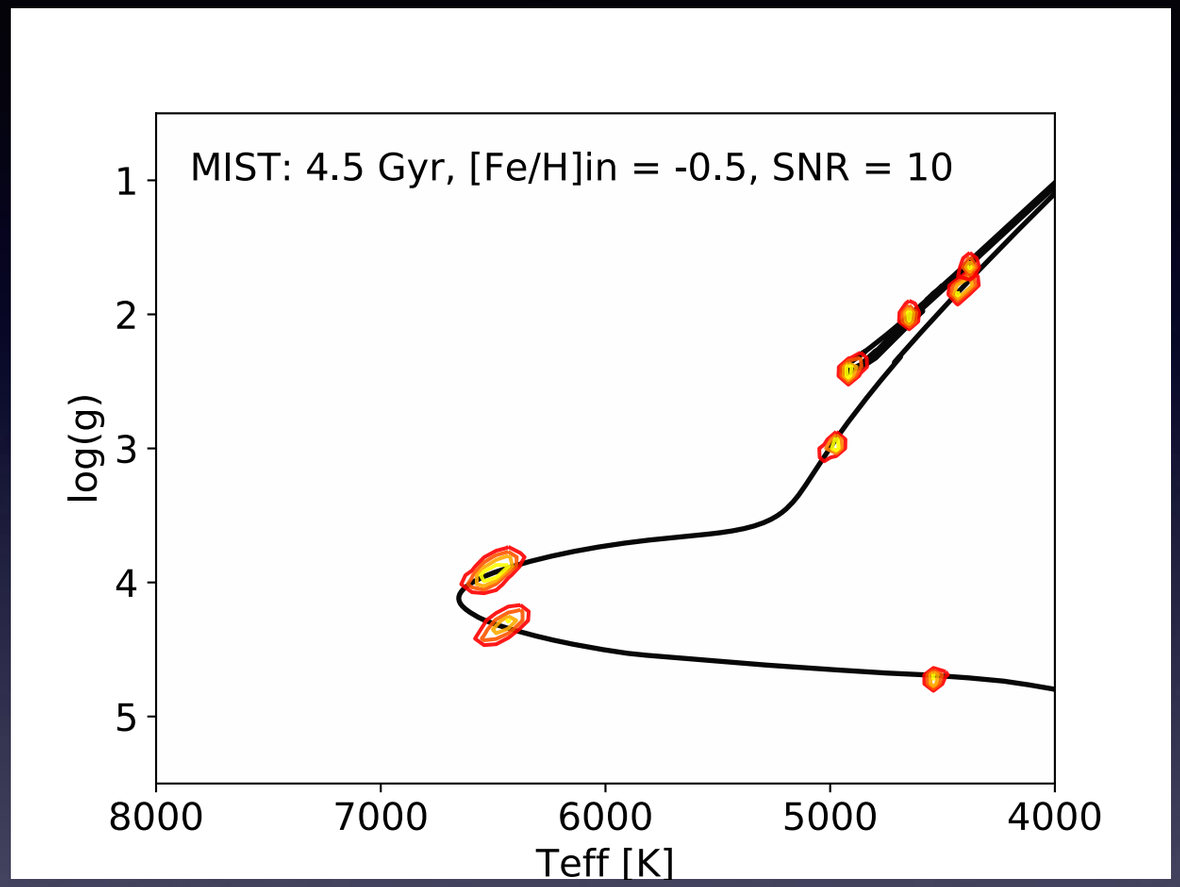

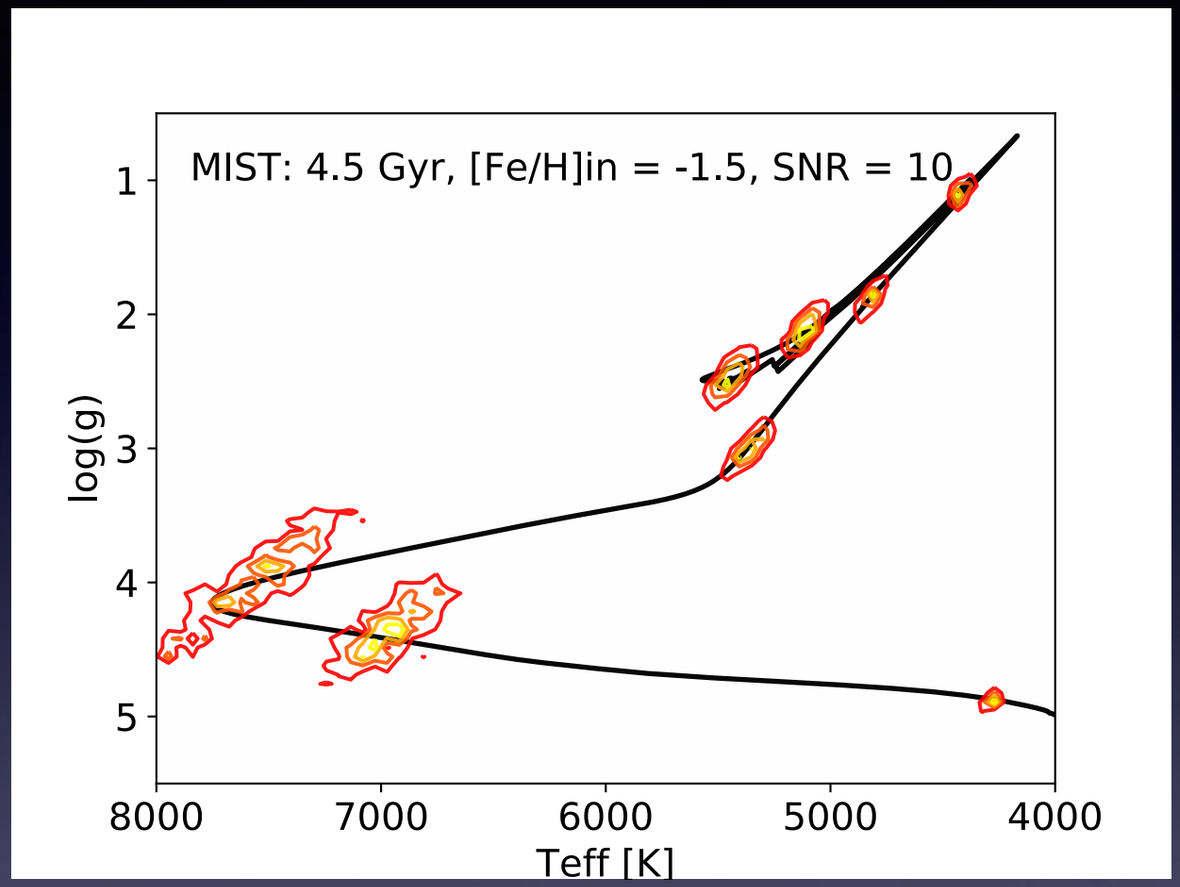

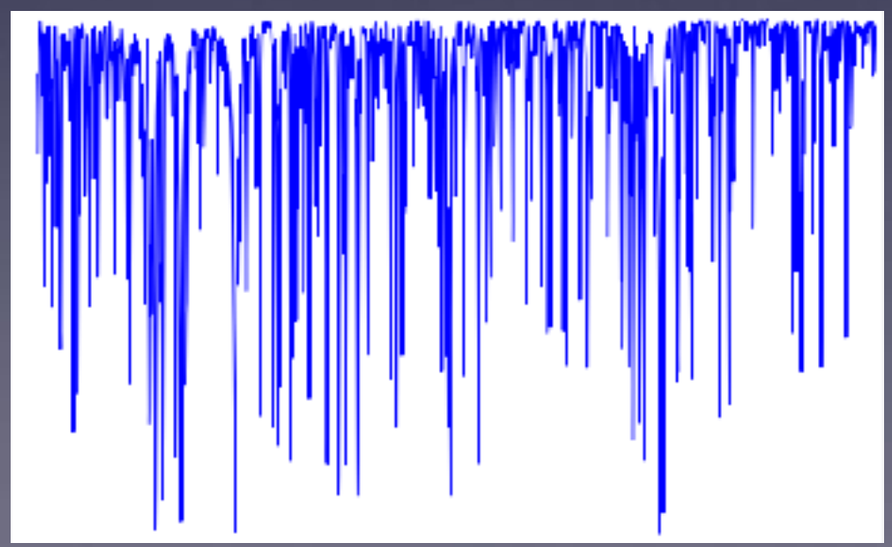

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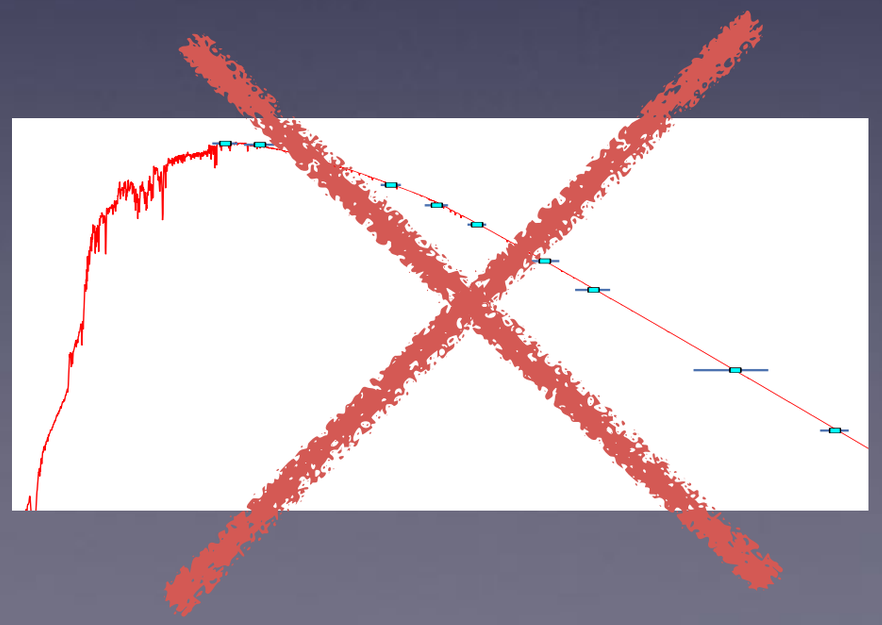

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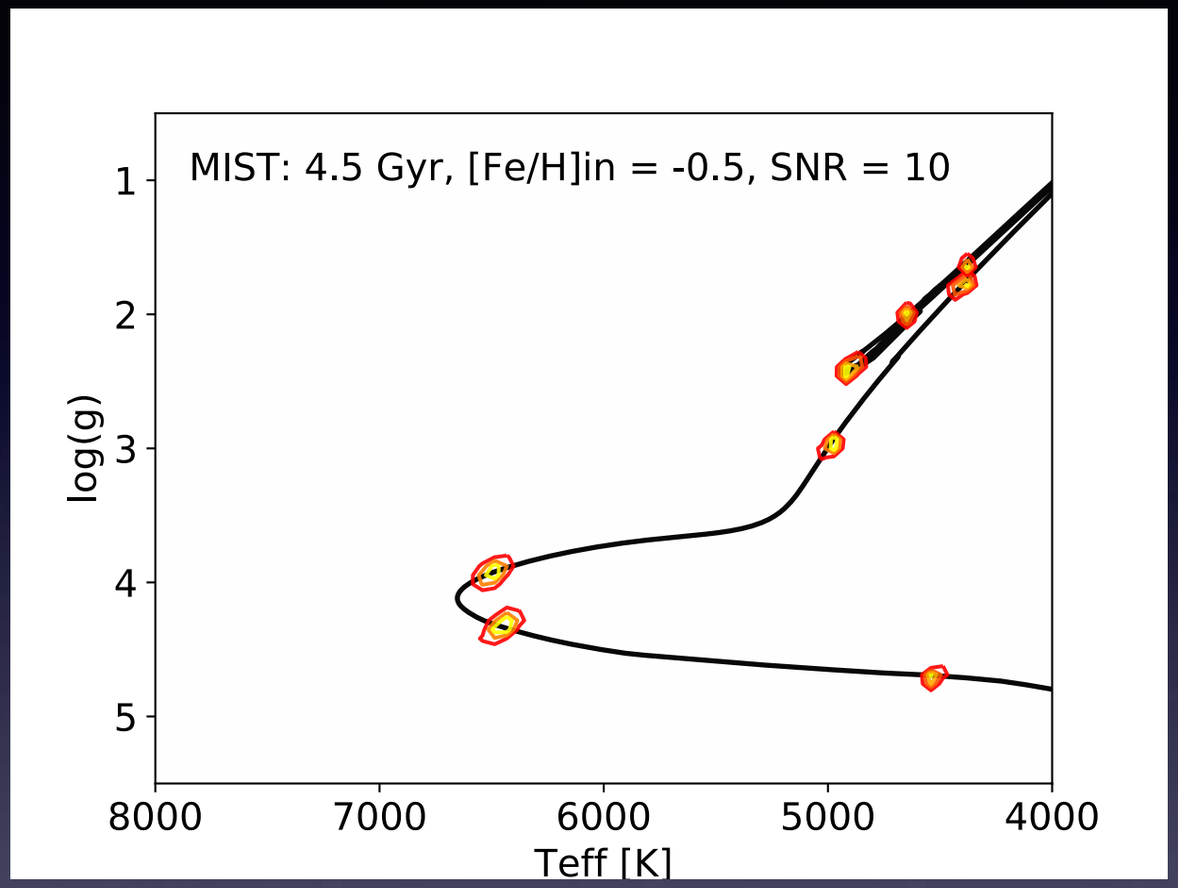

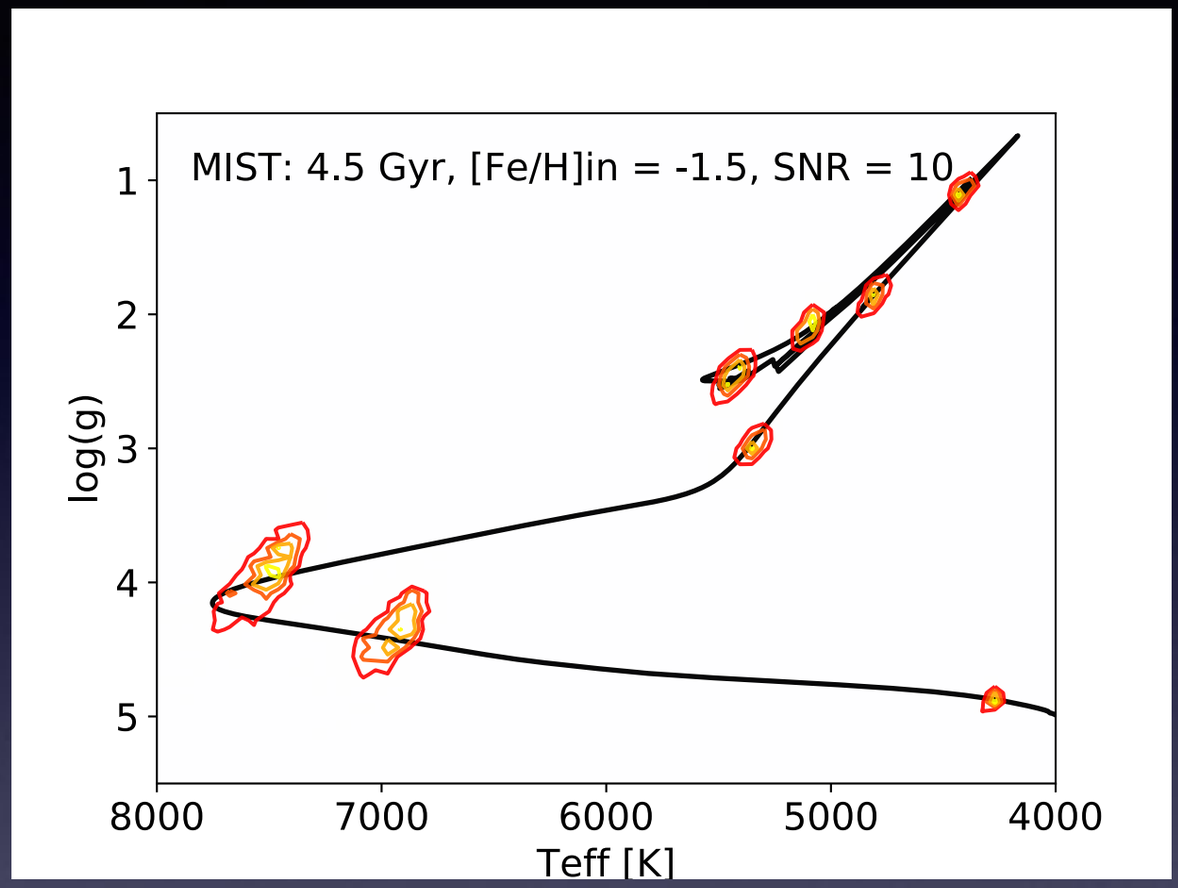

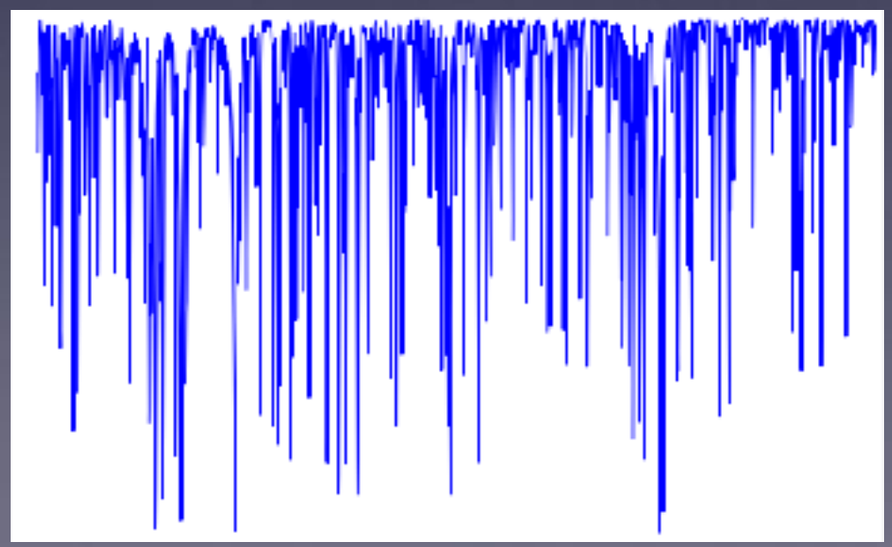

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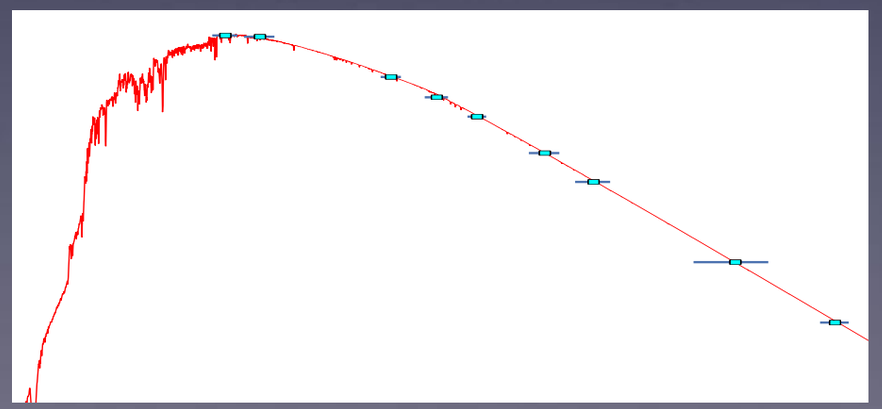

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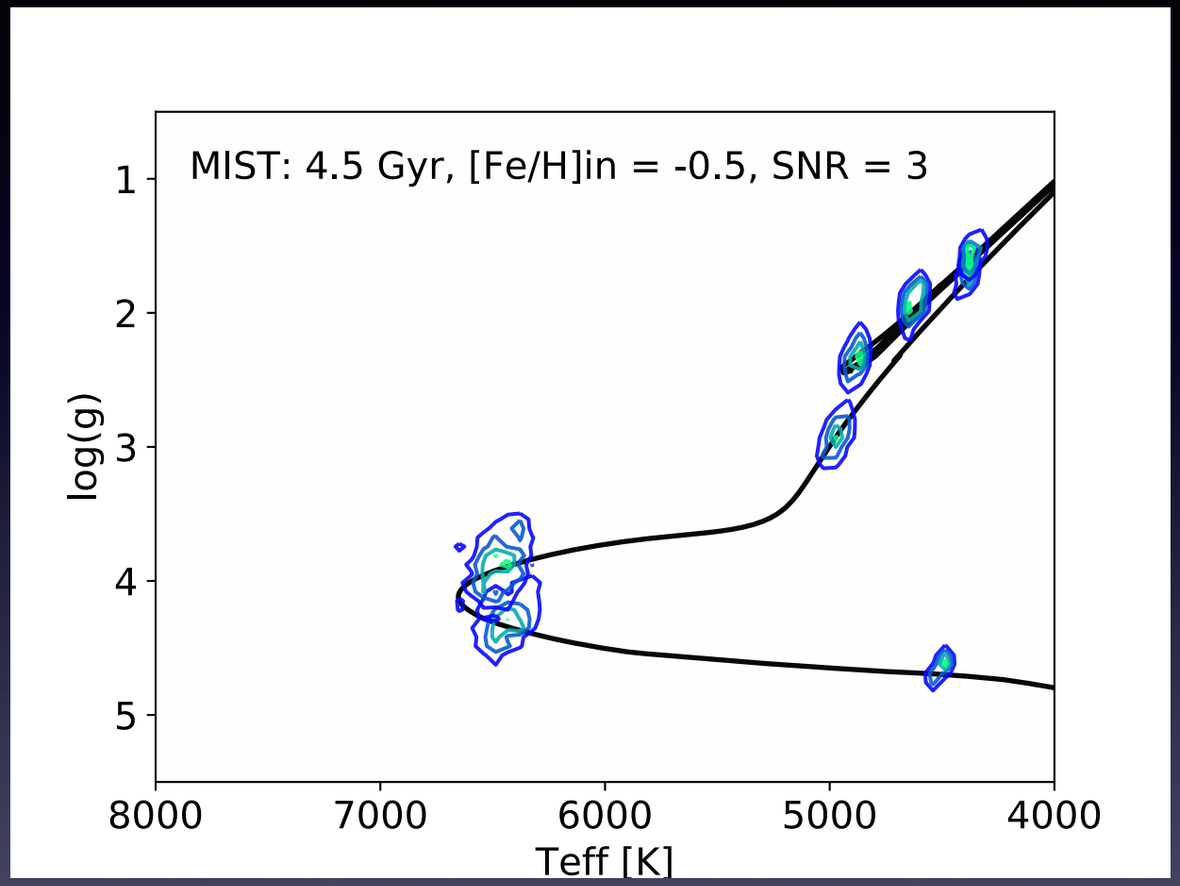

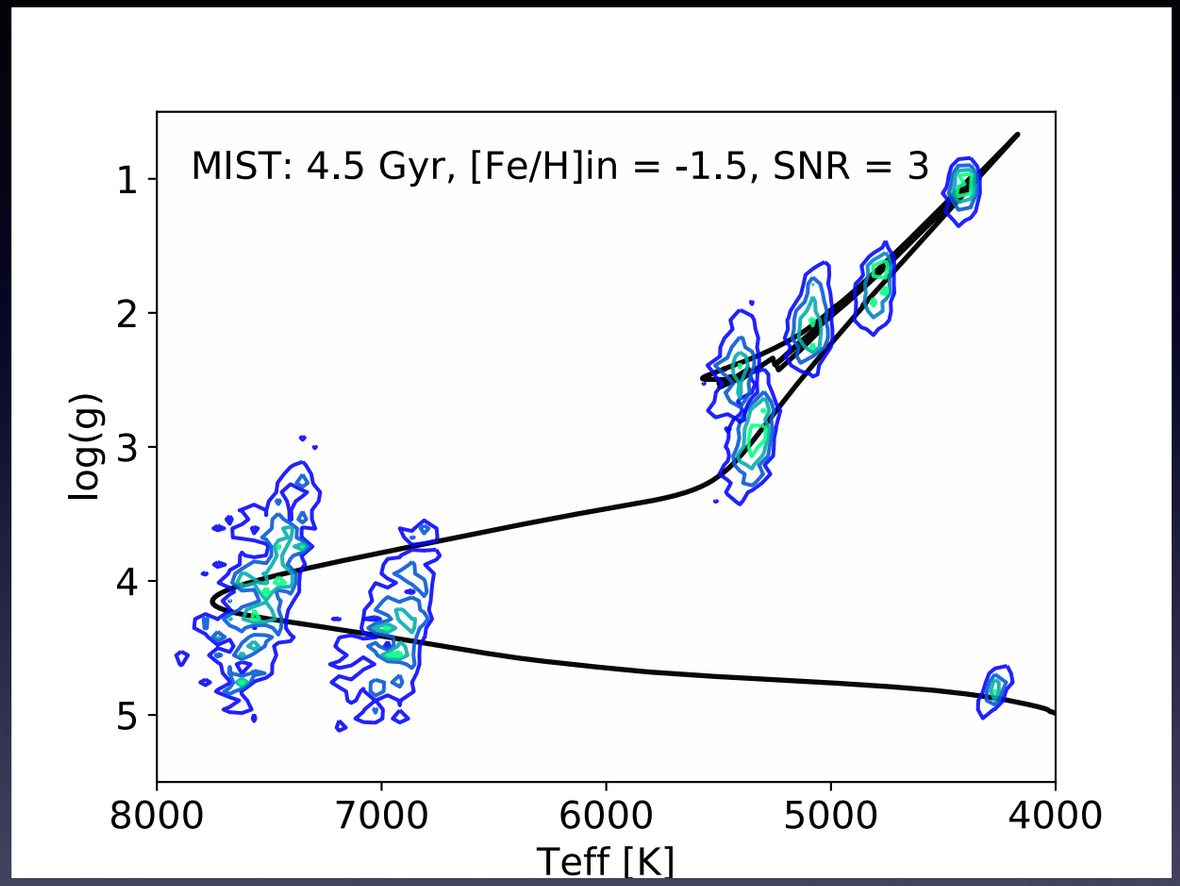

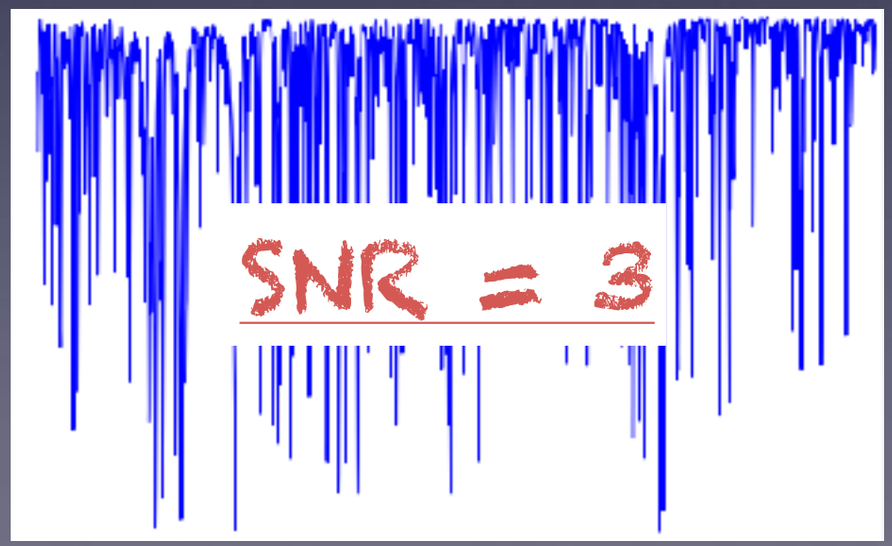

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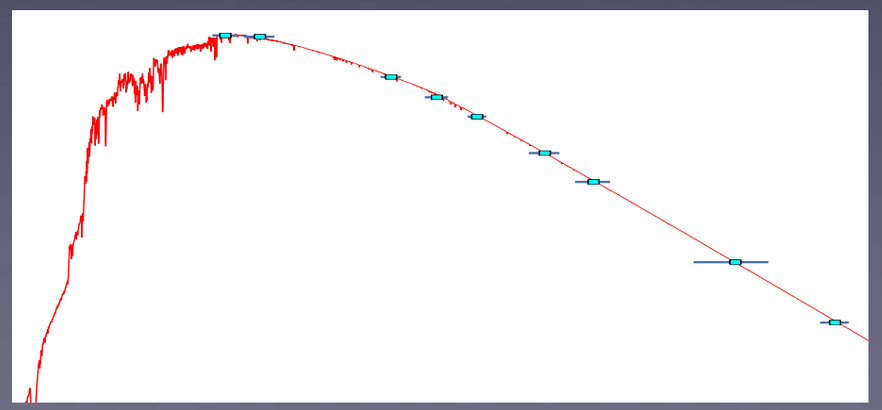

Conclusions:

- New C3K ATLAS/SYNTHE Synthetic Spectral Grid
- MIST V1.0 available, V2.0 released this winter
- The Payne, how can we help you with all your stellar modeling needs?
- Expanding The Payne: Training on other parameters; + MIST development, fitting spectra with stellar isochrone priors.

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Questions?

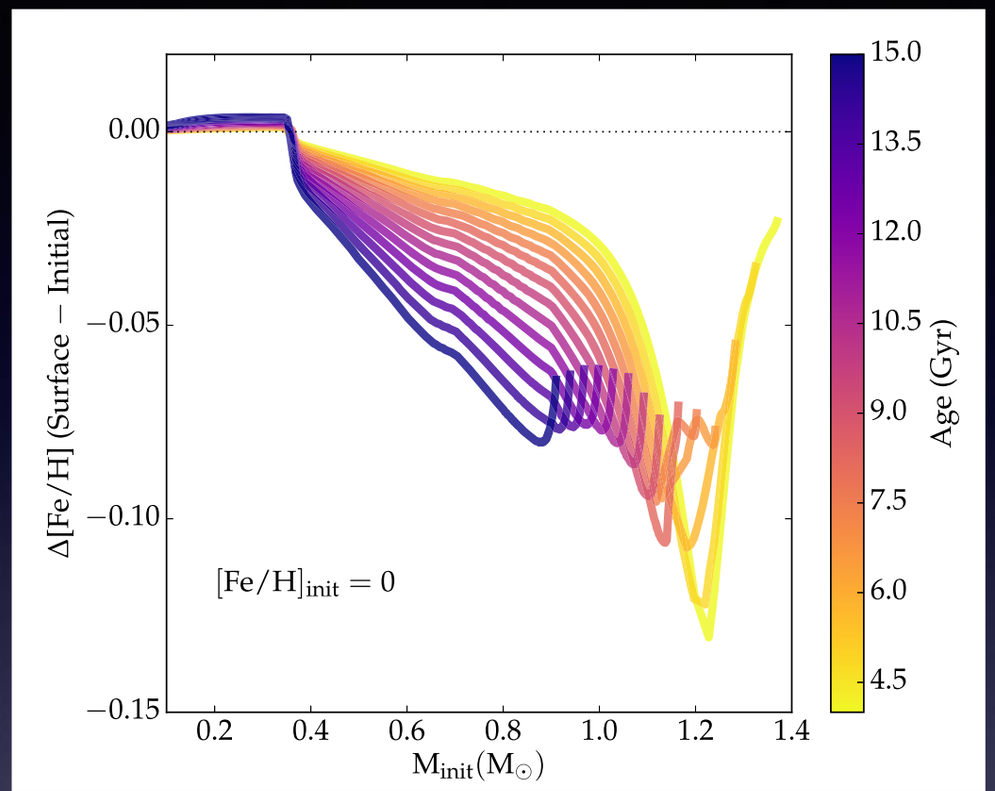
Ex:

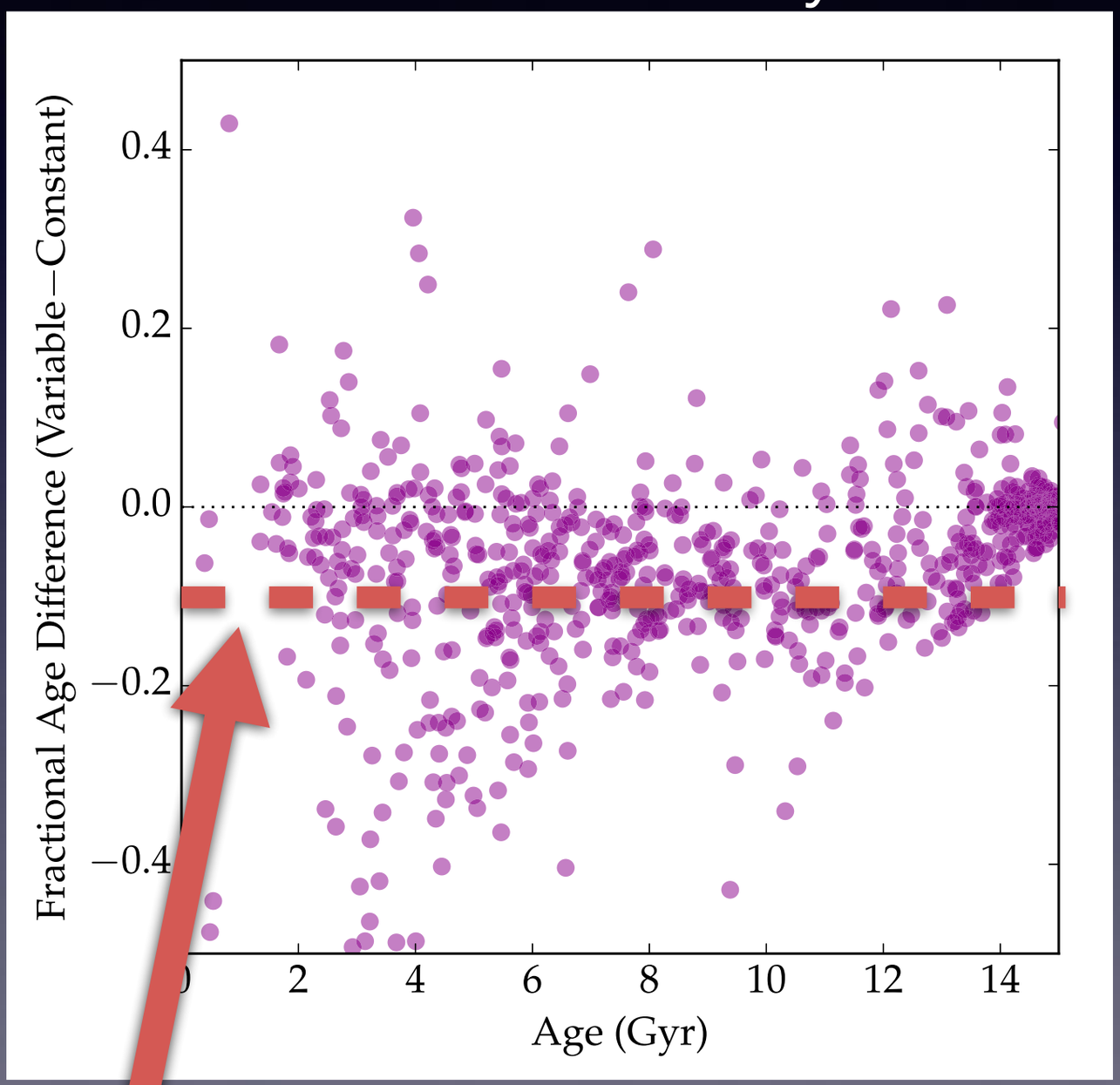
The Influence of Atomic Diffusion on Stellar Ages and Chemical Tagging

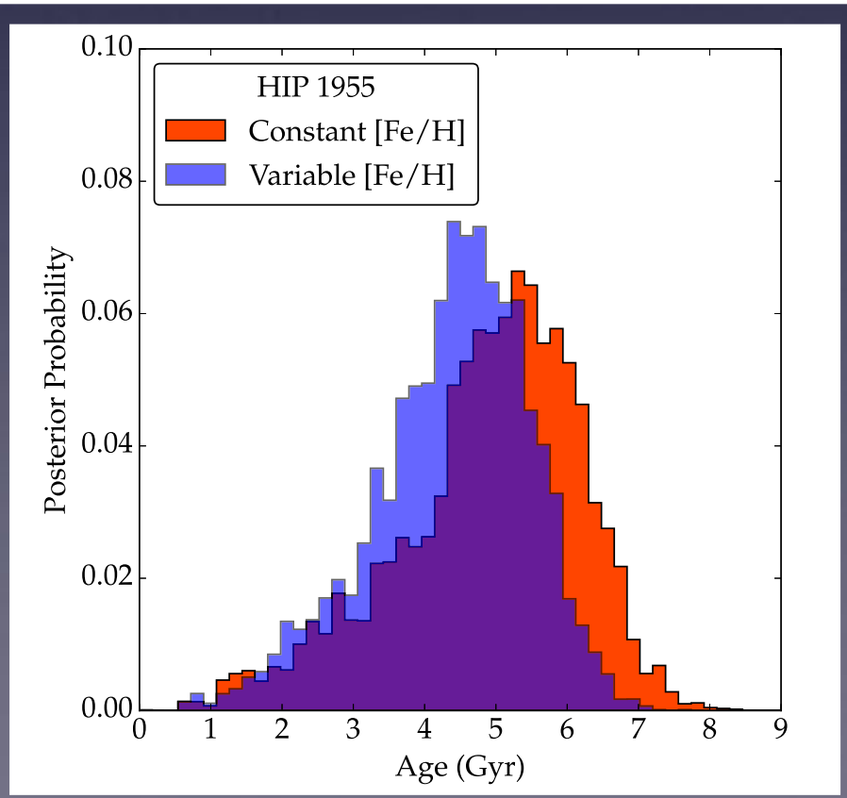
Aaron Dotter[1], Charlie Conroy[1], Phillip Cargile[1], and Martin Asplund[2]

+ MINESweeper

Bensby+ 2014







~10% Difference in Isochrone Ages