An introduction to

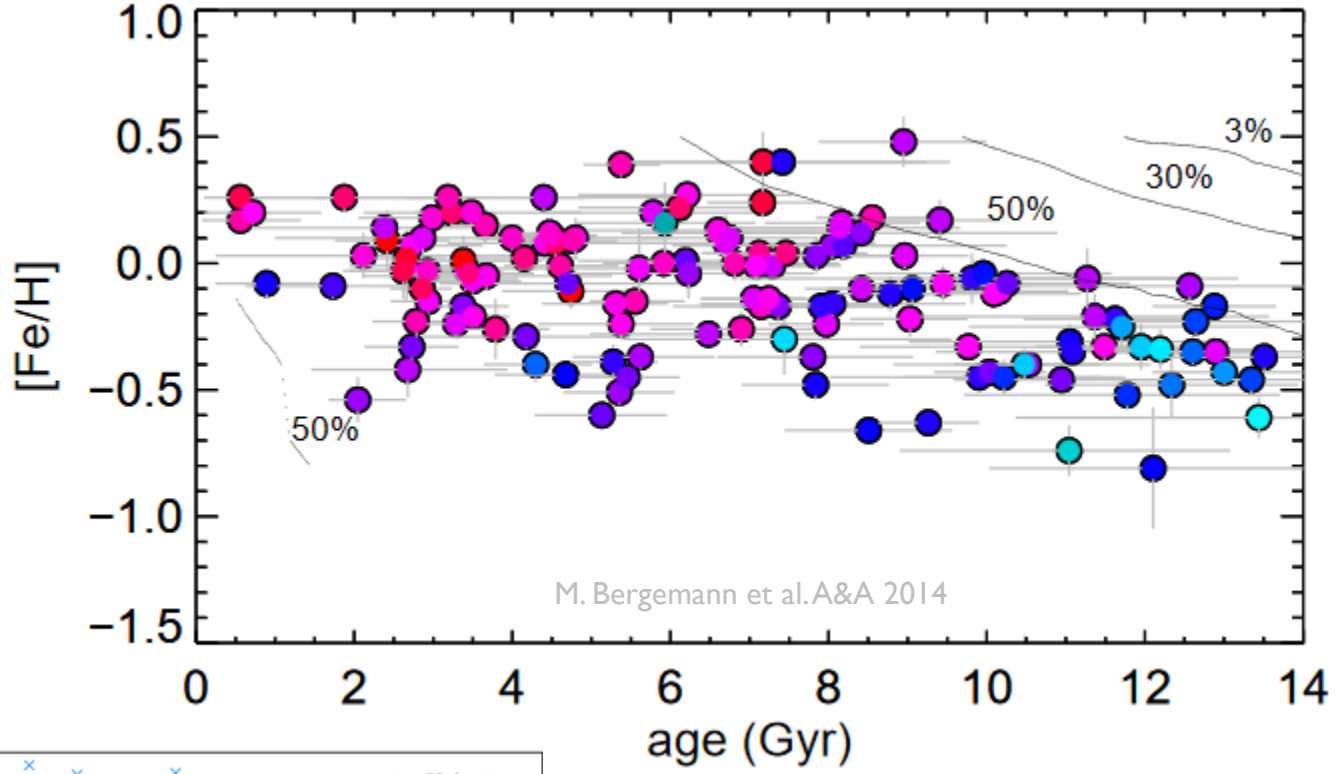
Stellar Spectra

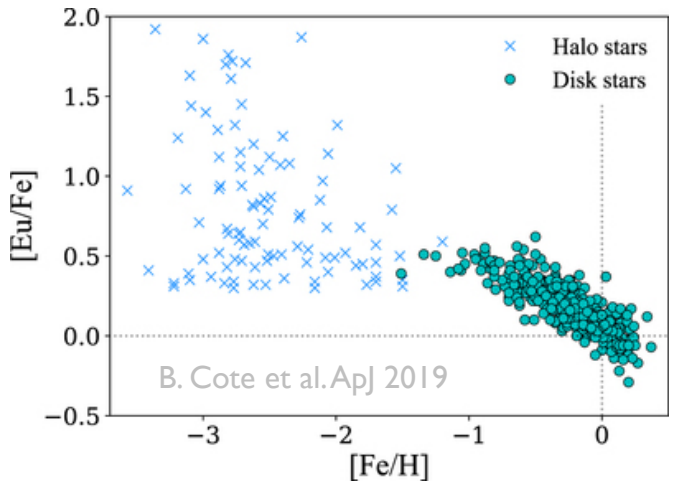
Zach Meisel

Ohio University - ASTR1000

Spectra can tell you the stellar composition …but

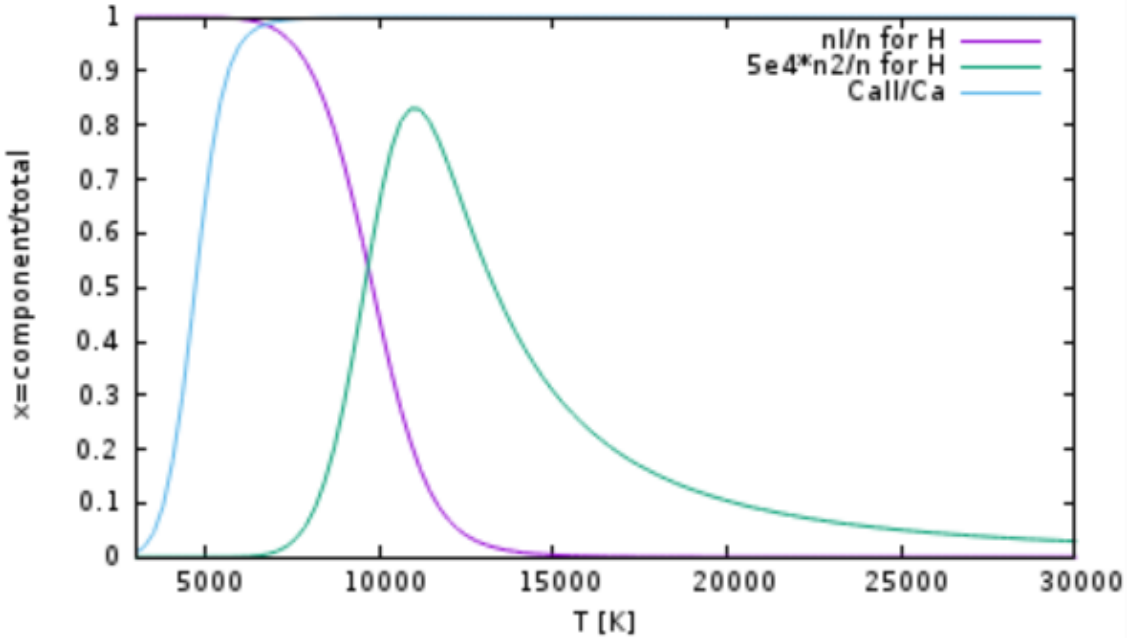
- Most stars are pretty similar in composition!
- Spectra are nonetheless extremely valuable, providing constraints on the stellar temperature, radius, and motion
- Importantly, some stars do vary quite a bit in composition, and these are key to understanding the origin of the elements



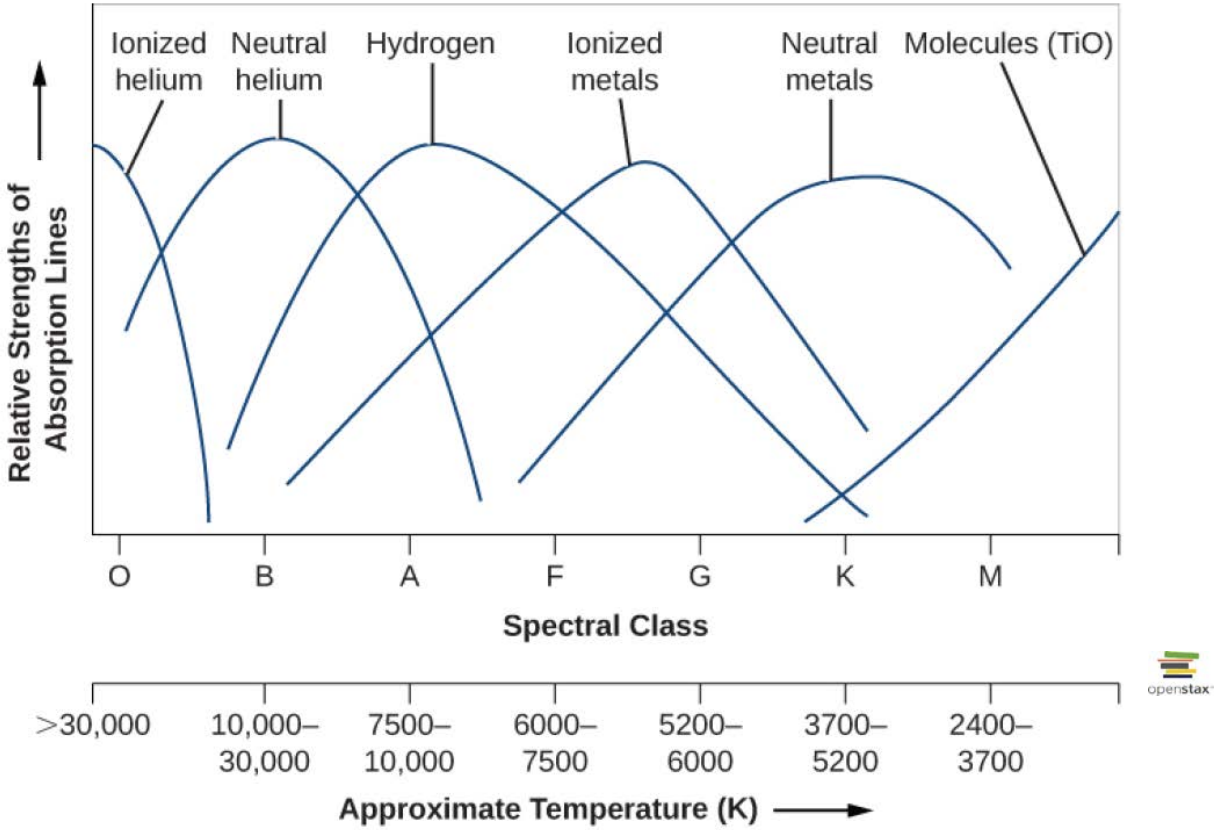


Spectra & stellar temperature

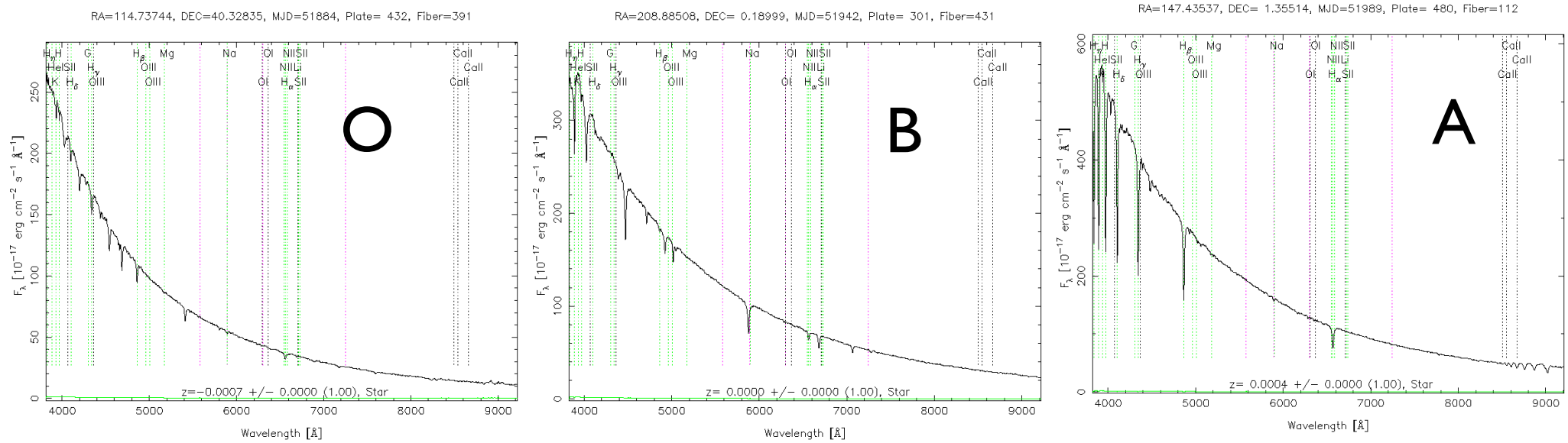
- Recall from "introduction to spectra" that the degree of atomic ionization and excitation will depend on the temperature.

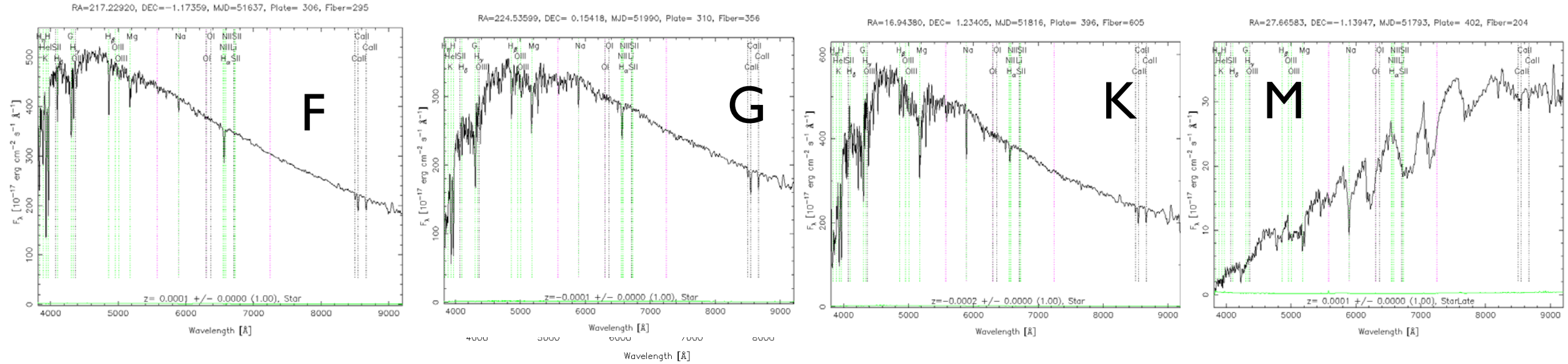


- Atomic (and molecular) absorption therefore depends sensitively on the temperature and so the relative strength of lines determines the spectral type

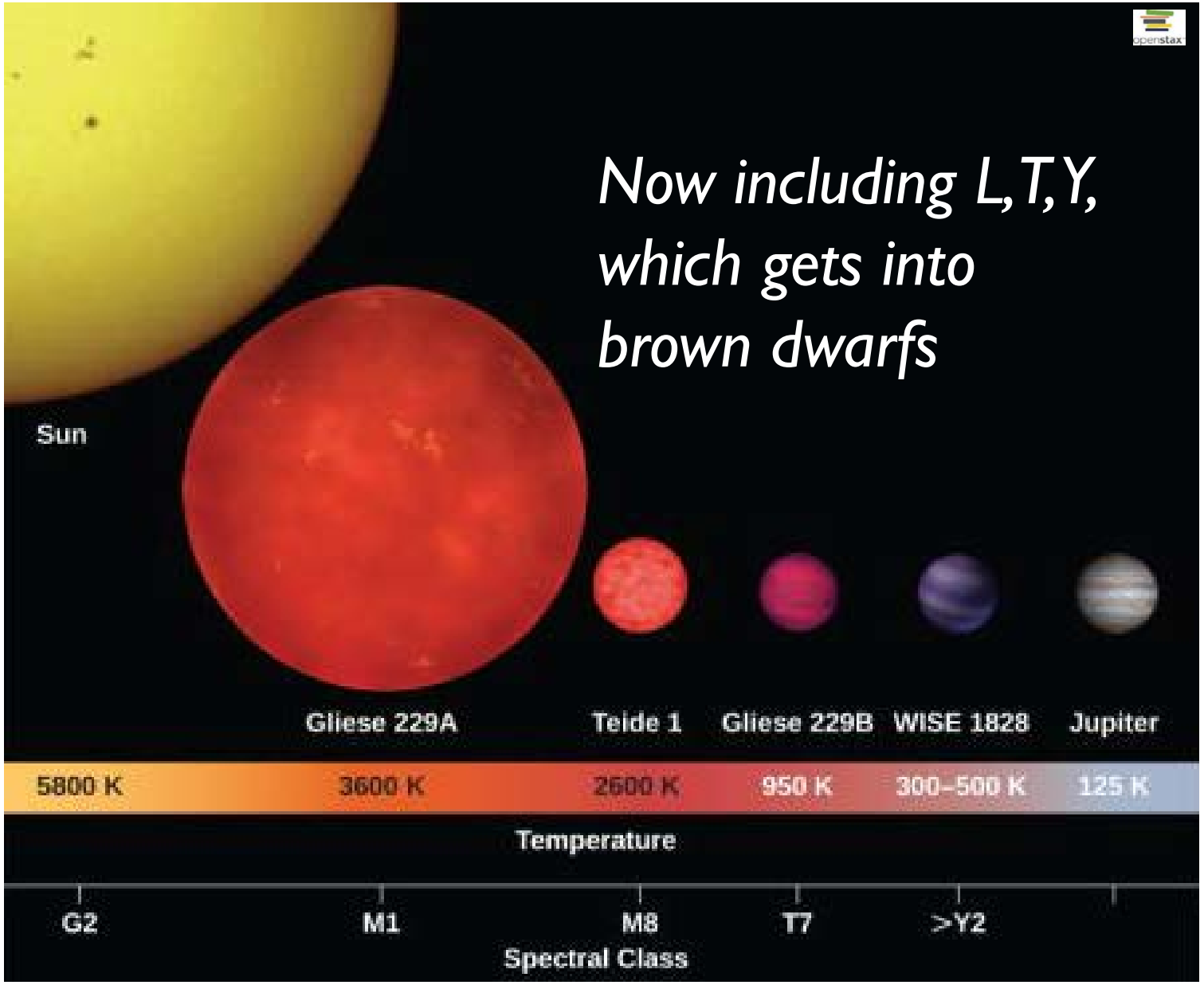


Spectra & stellar temperature (a.k.a. classifications)



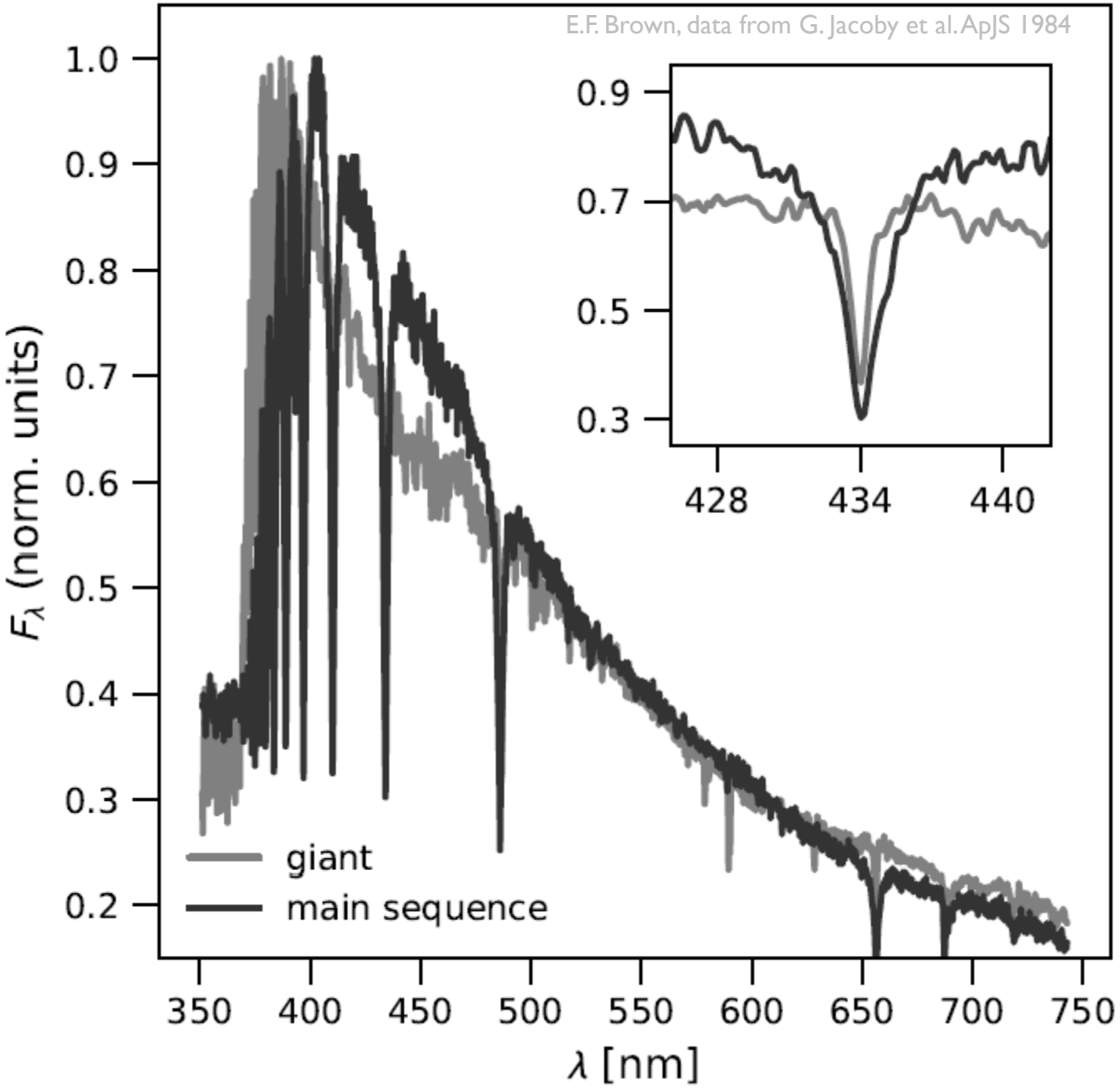


Spectra & stellar temperature (a.k.a. classifications)



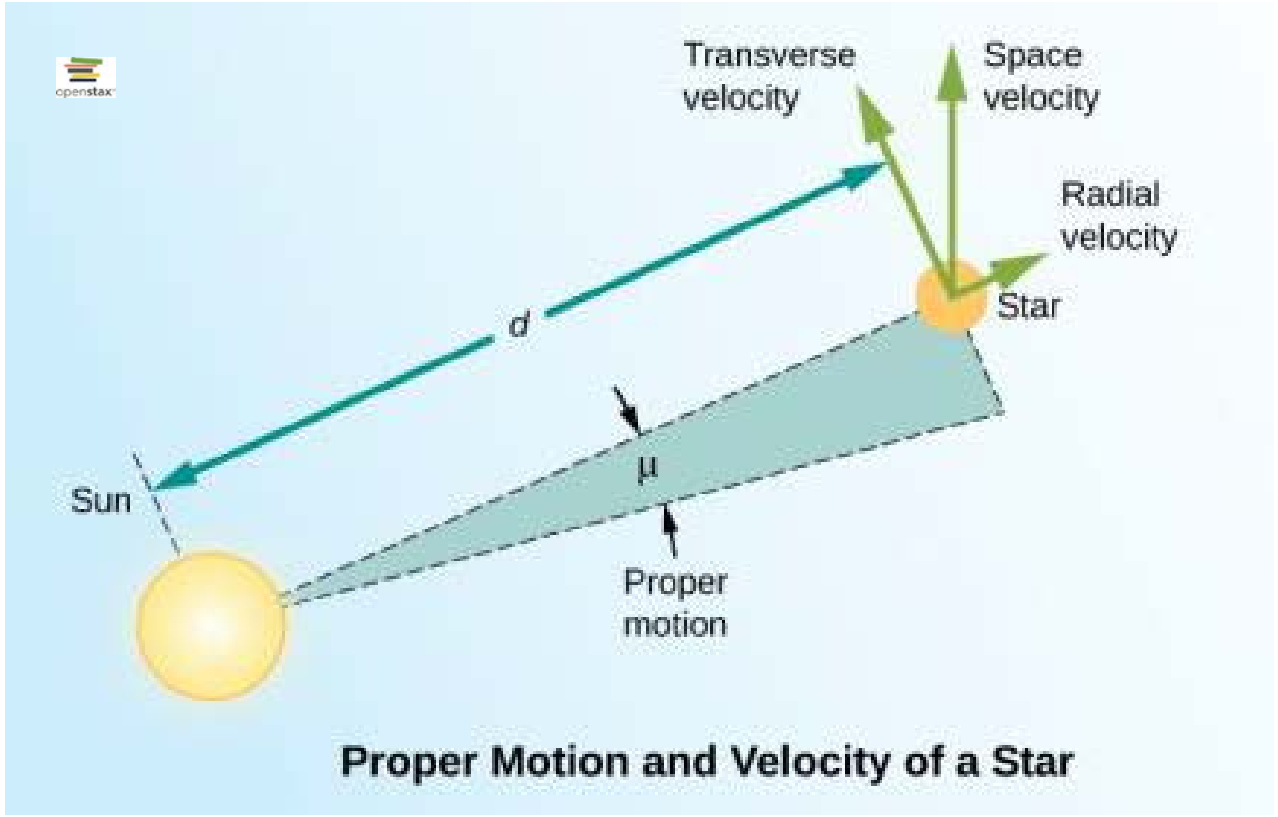
Spectra & stellar radii

- While the location of a spectral line indicates an element is present, the width of a spectral line contains information too
- Aside from rotation (see *Introduction to Spectra*), the width is also related to the pressure in the local environment.
  - Closer to the rest of the star
    = more collisions
    = broader spectral line
  - Further from the rest of the star
    = fewer collisions
    = narrower spectral lines

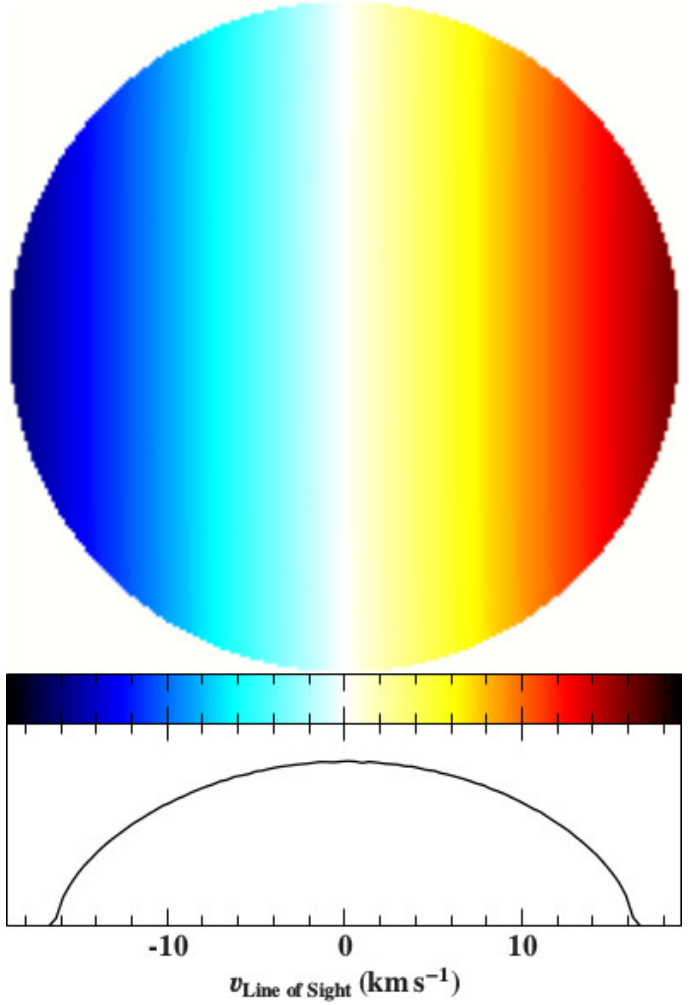


Spectra & stellar motion

Can use spectra for radial velocity



and rotation rate



(see *Introduction to Redshift*)

A. Irrgang