An introduction to Stellar Spectra

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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)
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Now including L, T, Y, which gets into brown dwarfs
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)