Spectroscopic Binaries...some real data
courtesy of Eric Jensen

Note: an Angstrom unit is 1/10 of a nanometer
The Doppler effect is quite simple – waves “pile up” in the direction of motion, as each successive wave is emitted *later*, when the source is closer to the observer.
Same star, 2 successive nights

- iron
- lithium
- calcium

**Graph:**

- **Title:** HIP 100117, single-lined spectroscopic binary
- **Dates:**
  - August 12, 2000
  - August 13, 2000

**Axes:**

- **X-axis:** Wavelength (angstroms)
- **Y-axis:** Spectral lines

**Graph Description:**

- The graph shows two spectral lines for HIP 100117.
- The spectral lines are labeled for August 12, 2000 and August 13, 2000.
- The y-axis represents the intensity of the spectral lines.
- The x-axis represents the wavelength in angstroms.
What does it mean that every line shifts to shorter wavelengths from one night to the next?
Does it mean that the star is *moving*?

More – it means that its speed is **changing** – it is *accelerating*.
the calcium line has 
\( \lambda_{\text{lab}} = 6719.0 \) Angstroms

measure \( \lambda \) = 6719.5 on August 12

and \( \lambda = 6717.2 \) on August 13
20 km/s away from us to 80 km/s toward us in just one day.
The same spectroscopic binary, on two successive nights.
A spectroscopic triple system.