Today

- Our Spring SKY with "Fritz" the Zeiss
- "Journey to the Stars" show from AMNH
- Why temperature and spectral lines are closely linked in classifying stars O B A...M
- Proceed to lay the stars out on the "Hertzsprung – Russell" (or H-R) diagram

- Re-read Chap 15, 'Surveying the Stars'
- New Homework # 5.5 out today, HW # 5 due
- New Discussion Q: Cities of Stars (due next Tues)

Devising the strange temperature code

- Original classification of spectra (1890) was:
  - A = strongest hydrogen feature
  - B = less strong hydrogen ...C, D, etc.
- Annie Jump Cannon realized that a different sequence made more sense (~1910)

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Which absorption (dark) lines are strongest?

Cecelia figured out WHY stellar spectra are so different: TEMPERATURE

- She showed that SURFACE TEMPERATURE is the big factor (not composition)
- She used the newly-devised SAHA EQUATION, estimating how many electrons remain attached to atoms as temperature is changed (or the level of ionization)

Spectral Classification: O B A F G K M

O B A F G K M \rightarrow decreasing temperature
Why temperature and spectral lines are linked?

SAHA gives the answer:

SAHA can estimate the population of different energy levels in H, He...

SAHA predicts spectral line strengths with temperature.

The biggest ground-based telescopes with adaptive optics can measure a star's position to accuracies of about 0.05 arcsec. How far away could they map the positions of stars via parallax?

- A. 2 pc = 6.5 light years
- B. 20 pc = 65 light years
- C. 200 pc = 650 light years

Parallax

B. maximum distance is set by the accuracy with which you can measure positions in the sky (space does better than ground)

\[
\text{Distance (pc)} = \frac{1}{0.05 \text{ arcsec}} = 20 \text{ pc} = 65 \text{ ly}
\]

Oh to describe a star!

B. Which is a red supergiant?

- A. Spectral type G2, luminosity class V
- B. Spectral type M2, luminosity class I
- C. Spectral type O9, luminosity class I
- D. Spectral type M1, luminosity class V

Puzzle Clicker: Stellar Parallax

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Distance (pc) = \frac{1}{0.05 \text{ arcsec}} = 20 \text{ pc} = 65 \text{ ly}

H - R Namesakes

Ejnar Hertzsprung

Henry Norris Russell
Now on to Fritz and Spring Sky

“Journey to the Stars”

25 minute HDTV video production from Hayden Planetarium, AMNH