Spectral Classes
• Original system based on the strength of the Hydrogen lines
• Classified stars from A to O (maybe P and Q)

The Harvard System
• Examined more than the Hydrogen lines
• Principle Researchers - They didn't get the credit!
  – Annie Jump Cannon
  – Antonia Maury
  – Williamina Fleming
• OBAFGKM
  – ‘Oh Be a Fine Girl/Guy, Kiss Me’

OBAFGKM
• The Harvard System
  – More refining
  – Each type was divided into 10 sub-types
    • F0, F1, F2, … , F9, G0, G1, … etc.

Spectral Type and Temperature
• Cecilia Payne and Maghnad Saha
• Surface Temperature
Line Strengths

- O stars have features which can be seen only if the temperature is above 25,000 K
- M stars have features only seen if the temperature is below 3000 K

Size

- To understand size we need to know about luminosity and surface temperature
  - This means we need to know distance and apparent brightness

  \[ L = 4\pi R^2 \sigma T^4 \]
  - Luminosity = Surface area (Stefan-Boltzmann)

H-R Diagrams

- Initially plotted \( L \) vs. \( CI \) and \( L \) vs. Spectral Type
- Combine them

Where are the stars on the HR Diagram?

- Most of the stars were found on the Main Sequence
- And the rest?
  - Main Sequence
  - Other Regions

Luminosity Classes

- Ia - Luminous Supergiants
- Ib - Less Luminous Supergiants
- II - Bright Giants
- III - Giants
- IV - Subgiants
- V - Main Sequence or Dwarfs
- VI - Subdwarfs
The Sun

- The Sun is a G2 V star
- K5 III will be...

Masses on the HR diagram

- On the main sequence we find that the earlier the spectral type the more massive the star