Outline

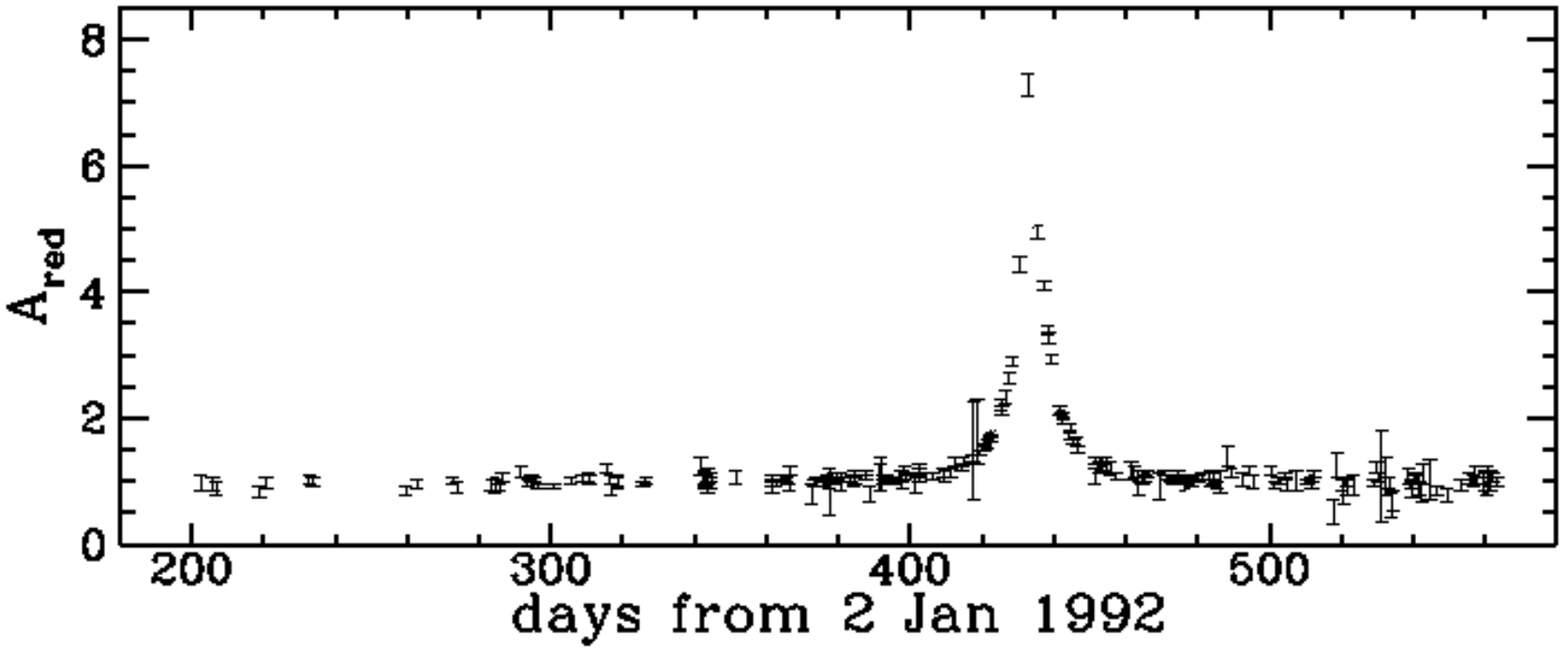
- Exam will be draw from material in Chapters 6 and 7.
- It may be useful to study these problems and the homework problems. Also read over the textbook and class notes for short answer questions.
- I might be unable to resist putting on a dimensional analysis problem.

Rotation curve

- The dark matter halo of the Milky Way has a density profile that depends on radius raised to some power *n*. Derive the value of *n*. Explain the key observational motivation and show the steps in your derivation.

Gravitational lensing

- The light curve below is of a star in the LMC from the MACHO experiment. Assuming the lens is in the halo of the Milky Way, estimate its mass.



Gravitational lensing

- Derive equation 6.44.

Cluster gas

- The luminosity per unit volume due to thermal bremsstrahlung of a hot plasma is

  $\varepsilon = 2.4\times10^{-27}\, T^{1/2}\, n_e^{\,2}$ erg/s/cm^3

  where T is the temperature in K and

  n_e is the electron density in electrons/cm^3.

- The Coma cluster has a radius of 1.5 Mpc, a temperature of about 8 keV, and an X-ray luminosity of 5×10^{44} erg/s. Estimate the mass of the hot plasma in Coma.

Isochron plot

- 147Sm decays to 143Nd with release of an alpha particle with a half-life of 106 Gyr.
- Estimate the age of the moon rocks in the plot below.