Important Ideas Covered in the 2nd Half of Class
AST 6112, Fall 2013
Planetary Astrophysics
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Solar System Pupulations

- Solar system inventory (Mostly covered by student presentations)
  - Moons
    - Titan, Enceladus,
  - Planets
    - Mars, Venus, Mercury
  - Minor planets
    - Asteroids, Kuiper Belt Objects, Saturnian Ring System
  - Meteorites, Comets

Planetary Atmospheres

- Heat transport mechanisms and where in the atmosphere they are dominant and why?
  - Conduction, Convection, Radiation, Diffusion
- Temperature and density gradients
  - Derivations of various lapse rates
  - Problems related to the lapse rates
    - Is it possible for an atmosphere to support super adiabatic lapse rates?
- What can you infer from studying the lapse rates and spectroscopy of an atmosphere?
  - Spectroscopy was covered somewhat by Chutipong
  - Read Seager's review paper
- Greenhouse effect: problems
- READ dP&L Chapters: 4-4.2.2, 4.3-4.3.2, 4.4-4.4.3, 4.6-6.1.1.1, 4.6.2, 4.8, 4.9.1
- Solve problems similar to homework, and "E" marked problems in the book.

Planetary Interiors

- Hear transport mechanisms
- Relevant observables to learn about planetary interiors
- Hydrostatic equilibrium and shape of a self gravitating body
  - e.g., what is the minimum mass for a self gravitating body to become spherical?
  - Challenges for modeling the interior structures?
  - Equatorial bulge
- Heat sources
  - Equilibrium temperature from irradiation
  - Internal heat sources
- READ dP&L Chapters: 6-6.1.5.2, 6.4.1
- Try to solve "E" marked problems from the book.

Meteorites

- Meteritic clues towards planets and solar system formation.
- Broad classifications
- Dominant chemical compositions
- Evidences for their origin, aboriginal nature
- What happens during the fall?
  - e.g., How massive a meteorite must be able to hit Earth surface?
  - What must you know to do this calculation?
  - How will this be different in Moon? etc.
- Radiometric dating, age of the solar system.
- READ dP&L Chapters: 8 (Don't worry too much about remembering half lives or decay chains)
- Try to solve "E" marked problems from the book.

Comets

- Orgins
- Inference of the existance of an Oort cloud
- How is the Oort cloud replenished?
- Gas production and outflow rate as a function of the comet's distance from the star
  - Problems!
- Brightness as a function of the distance from the star and observer
  - Problems!
- READ dP&L Chapters: 10 (Don't worry too much about compositions)
- Try to solve "E" marked problems from the book.

Minor Planets

- Major classes based on the location in the solar system
  - Asteroid subclasses (Also see Pakkie's talk)
  - TNO subclasses (Also see Wenli's talk)
- Size distribution, estimate of total mass
- Comparison in mass, size, binarity between asteroids and KBOs
- Dynamical constraints and clues to early solar system formation
  - Grand tack, Nice II
- Observational methods and what can be learnt using various wavelengths
- Rotation barrier
  - Problems!
- READ dP&L Chapters: 9 (Skip 9.5)
- Try to solve "E" marked problems from the book.

Exoplanets

- KPC property trends (Batalha et al. 2013)
    - Class presentation
- Eccentric giants, hot jupiters, RM effect and observations, TTVs, exoplanet atmospheres (student presentations)

General Comments

- In general be ready to solve problems and remember basic concepts
- There will not be too many questions where only your memory is tested
- Basic physical concepts in the second half of the class:
  - Hydrostatic equilibrium
  - Heat transport mechanisms
  - Temperature gradients based on transport mechanism and gas properties
  - Radiactive decay
  - Multi-wavelength observations of small bodies and what wavelength is best optimized for what observation