Conclusions and Review
Lecture 37

Mars Science Lab Launch

Final Exam Reminder

- **Final Exam:**
  - Friday, Dec 7, 2:00 – 4:30 PM
  - BKL 200: Baker Lab 200

- **Make-up Final**
  - Tuesday, Dec 11, 7:00 – 9:30 PM
  - 105 Space Sciences Building
  - You must have a valid reason to take the make-up
  - You must get prior permission and sign up before the end of classes (Friday, Nov 30 – today!)

- **Review Sessions – Malott 251**
  - Monday, Dec. 3 from 6:30 – 8:30 pm
  - Tuesday, Dec. 4 from 6:30 – 8:30 pm

Practice exams will be available later today
Closed book, closed notes. No calculators, no cell phones, etc.
Lecture Topics

- Some conclusions
- Review of potential exam topics
  - Not guaranteed to be comprehensive
- Slide show

What should you take away from this course?

- Perspective about ourselves, planet earth, and the universe.
- A desire to inquire and learn more about the universe around us.
- Critical (and quantitative) analysis of the world.
Quantitative Exam “questions”

- How big, how small, how massive
  - From Atoms to the Universe
- Distance, velocity and time
- What’s up tonight?
  - RA vs. day and time
- Blackbody emission
  - Wien’s law
  - Stefan-Boltzmann Law
- Doppler effect
- Energy vs. wavelength for photons

Quantitative questions (cont’d)

- Luminosity
- Parallax
- Inverse square law
- Magnitudes and the distance modulus
  - Absolute and apparent magnitude
- Black Hole Size
- Habitability of Planets
  - Applying the balance of powers
Conceptual Questions

- Atoms and Spectra
  - Bohr model of the atom
- Kirchhoff’s laws
- Types of Telescopes
- Energy Transfer
- What’s up in the sky “tonight”
  - How the sky changes over a night
  - How the sky changes over the year

Conceptual Questions (cont’d)

- Stars
  - Spectral sequence
  - Rough lifetimes of stars
- H-R diagram
- Energy generation in stars
- The life of a star
- Stellar end-products
  - What’s left and why?
Conceptual Questions (cont’d)

- Special Relativity
  - Postulates and Consequences
  - Rough velocity addition
- Supernovae and the collapse of stars
  - What happens?
- Neutron Stars and Pulsars
- General Relativity and Black Holes
  - Postulates and Consequences
  - “Proofs”

Conceptual Questions (cont’d)

- Types of star clusters and properties
  - Open (Galactic), Globular, O/B Association
- Properties of the Milky Way
- Types of galaxies and properties
- Hubble’s law
- Why $\Omega$, $H_0$, and $\Lambda$ are important
- The Fate of the Universe
- The Early Universe
Conceptual Questions (cont’d)

- Habitability of Worlds around stars
  - What determines the ecosphere?
  - Where to look for life and why?
- How to search for other worlds
- Looking for intelligent life in the universe.
- Limits to civilizations ...