Astronomy 150
Spring 2012

Review
Exam 3

Key questions

- What is a gamma ray?
- Why do we have to go to space to detect gamma rays?
- How were gamma-ray bursts first discovered?
- What is the distribution of GRBs on the sky? Uniform? Lumped? Skewed?
- What do we think is the origin of long time GRBs?
- What do we think is the origin of short time GRBs?
- What is the main reason GRBs are so bright?
- What causes the jet in a hypernova?

Key questions

- What is the common feature (i.e. mechanism) for both long and short time GRBs?
- What are some affects of a nearby GRB on the Earth?
- What is Eta Carinae? WR 104? Which one might be pointed at us?
- Why are neutron star/neutron star or black hole/ neutron star mergers a less dangerous type of GRB?
- Which extinction event may have been caused by a GRB? What were some of the effects?
- GRB mitigation?

Key questions

- The speed of what is a measured constant regardless of your movement?
- Given that Einstein's theory of general relativity is a better theory of gravity than Newton's, when something falls off a building, why does it fall? What is gravity in this case?
- What is gravitational lensing? Do we have evidence that gravitational lensing really occurs?
- How does a massive object affect space-time?
- How does a massive object affect time and light?
- What is a black hole in Einstein's GR theory?
- Black holes are simple. What three properties do they have?
- Why are black holes with accretion disks so bright? Why is a black hole without an accretion disk so dim?

Key questions

- What is a black hole's event horizon?
- What is a black hole's Schwarzschild radius?
- What is a black hole's singularity?
- How do they change with mass?
- A probe/human falls into a black hole. Describe what happens to it.
- What is a tidal force?
- How can we detect a black hole? What about a non-accreting black hole entering our Solar System?

Key questions

- What's in the center of our Galaxy?
- How do we know?
- What is more likely to enter our Solar System, a star or a compact object (i.e. black hole, white dwarf, or neutron star)?
- What are possible effects of a black hole entering the Solar System?
- What are the effects of a black hole colliding with the Earth?

Key questions

- What is a quasar?
- How were they discovered?
- What powers a quasar?
- Are there any nearby quasars right now?
- What if Andromeda's BH feeds?
- What happens during the creation of Milkomeda? Any quasars-like properties?

Key questions

- What is the Milky Way?
- What type of galaxy is it?
- Where is the Sun in the Milky Way?
- What are globular clusters and what role did they have in understanding the Milky Way?

Key questions

- What are the four Copernican revolutions? Hint, the 4th is finding ET (We are not alone in the Universe.)
- What are the four components or structures of the Milky Way? In which structure is the Sun located?
- How do we know that the Milky Way has spiral arms?
- How do stars rotate in the disk of the Milky Way?
- If you have three stars at different locations in the disk, will they travel different distances in the same time?

Key questions

- What is a rotation curve of the Milky Way? And why is it flat? What does that mean? How do we explain it?
- What did the "spiral nebulae" turn out to be?
- What are the three types of galaxies?
- What is a spiral arm made out of?
- What might happen if the Solar System enters one?
- What does the color of a galaxy tell us about its stellar population?

Key questions

- Are galaxies usually alone? What is the local group?
- What happens when two galaxies collide?
- What might happen when Milkomeda is formed? What might happen to the Solar System? The Milky Way? Andromeda?
- What is Olber's paradox?
- How are galaxies moving? What does it mean? What is Hubble's Law?
- Is Brooklyn expanding?
- What are some misconceptions of the Big Bang?
- What was the Universe like early on?

Key questions

- Where was the Big Bang?
- What is the CMB? Where does it come from?
- What makes up a proton and neutron?
- What is Big Bang Nucleosynthesis?
- What was the Era of Recombination?
- What are the three big pieces of evidence of the Big Bang?

Key questions

- What is the most likely fate of the Universe?
- If the universe only contained matter, would its expansion accelerate or decelerate? Why?
- What is invoked to explain the acceleration of the Universe?
- What is the Big Bang?
- What is the Big Rip?
- What is the Big Crunch?
- What is the Big Chill?

Key questions

- If the Universe keeps expanding, what happens to our view of other galaxies?
- What is left after 100 trillion years?
- What is proton decay?
- What happens to all black holes with enough time?

Key questions

- We can estimate the number of intelligent life in the Universe how?
- We can estimate the number of intelligent life in the Galaxy how?

Key questions

- What does the Drake Equation tell us?
- What is the Habitable Zone?
- Does any evidence of life exist in the Solar System, except for Earth?
- Why don't we know about life on the early Earth?
- What are Extremophiles?
- Why is life on Earth ubiquitous?
- What is Panspermia?
- Why is alien bacteria or virus unlikely to be seriously dangerous to humans?

Key questions

- What are some problems with interstellar travel?
- What is an optimistic/pessimistic time estimate for an advanced civilization to colonize the Galaxy?
- What is the Fermi Paradox?
- What is arguably the simplest way for a civilization to explore the Universe? Hint, armchair explorers.