

## Physics 1061. Stars and Galaxies

### Final Exam, Ch 26 (and a little of Ch. 24) REVIEW.

(Please see previous Reviews for Ch. 23 Quiz, along with the previous exam and quiz review questions.)

#### Galaxies and Distances

- Most spiral galaxies have a rotation velocity that stays nearly constant with radius rather than decreasing. This indicates the presence of
  - globular clusters
  - dark matter
  - enhanced star formation
  - isotropy
  - Keplerian orbits
- For certain variable stars in the Magellanic clouds, it was found (in the early 20th century) that the brighter the star \_\_\_\_\_
  - the greater its diameter
  - the longer its period of oscillation
  - the rounder its shape
  - the further its distance
  - the shorter its period
- The \_\_\_\_\_ variable stars have a period of about 1 day.
  - RS CnVan
  - RR Lyrae
  - Delta Scuti
  - Beta lyrae
  - Cepheid
- Why are Cepheid variable stars so important in cosmology?
  - They are abundant in the solar neighborhood.
  - They can be used to find galaxy distances out to  $\sim 25$  Mpc.
  - They have an easily identifiable spectrum.
  - They are the oldest stars known.
  - They are brighter than RR Lyrae stars.
- When we know the apparent (or “relative”) magnitude of an object, all that we need to calculate its distance is \_\_\_\_\_.
  - its diameter
  - its absolute magnitude
  - its radius
  - its  $m_v$
  - its velocity
- Most of the galaxies ( $> 99\%$ ) are
  - moving around randomly.
  - showing Doppler blueshifts.
  - moving in circles.
  - rushing away from us.
  - approaching us.

7. Galaxy distance and Doppler redshift are correlated for galaxies. What do we call that correlation?
- (a) the Hubble law
  - (b) Wein's law
  - (c) Kirchoff's law
  - (d) the period luminosity relation
  - (e) Einstein's postulate of special relativity
8. One redshift-independent distance estimator which works for galaxies beyond 30 Mpc is \_\_\_\_\_.
- (a) Cepheid stars
  - (b) spectroscopic parallax
  - (c) Type Ia supernovae
  - (d) stellar parallax
  - (e) the Hubble Law
9. (3pts) Order these distance estimators by their height on the "distance ladder". Here, "1" will be the estimator for the lowest rung (i.e., limited to the shortest distances).
- |                              |                          |
|------------------------------|--------------------------|
| _____ Hubble's Law           | _____ Radar              |
| _____ Stellar Parallax       | _____ Tully-Fischer      |
| _____ Cepheids               | _____ Type Ia Supernovae |
| _____ Spectroscopic Parallax |                          |

### Cosmology

10. T or F. The motion of galaxies away from us proves that we are at the center of the universe.
11. The beginning of our observable universe is referred to as the \_\_\_\_\_.
12. Observations of Type Ia supernovae indicate that our universe is \_\_\_\_\_ in its expansion.
13. Our current best estimate of the age of the universe is
- (a) 10-13 million years
  - (b) 4.5-5 billion years
  - (c) 13-15 billion years
  - (d) 100-200 billion years
  - (e) infinite.
14. The critical evidence for cosmic acceleration in 1998 came from two teams of astronomers, both observing:
- (a) hypernovae.
  - (b) gamma ray bursts.
  - (c) type Ia supernovae.
  - (d) type II supernovae.
  - (e) ages of globular clusters.
15. What is the meaning of isotropic?

- (a) the same density everywhere
  - (b) the same in all directions
  - (c) the same at all times
  - (d) the same temperature everywhere
  - (e) the same in every way throughout space
16. \_\_\_\_\_ is the concept that the number of galaxies contained in a large region is about the same no matter where that large region is located in the universe.
- (a) Conformity
  - (b) Isotropy
  - (c) Universality
  - (d) Homogeneity
  - (e) Cosmology
17. The idea that the universe looks the same no matter where you are, is called the
- (a) cosmological principle      (b) law of gravitation      (c) cosmic quota
  - (d) anthropic principle      (e) Kansas principle
18. The age of the universe is
- (a) 10 -20 million years      (b) 4.5-5 billion years      (c) 100-200 billion years
  - (d) 10-20 billion years      (e) infinite.
19. The temperature of the Cosmic Microwave Background is now
- (a) 2 K      (b) 2.7 K      (c) 100 K      (d) 5800 K      (e) 1,000,000 K
20. T or F. The observable universe is finite while the universe may be infinite.
21. T or F. Astronomers think dark energy has a slowing influence on the expansion of the universe while gravity increases the expansion rate.
22. The Drake Equation is a way to estimate the number of intelligent civilizations in the \_\_\_\_\_.
- (a) sea      (b) solar system      (c) local group      (d) observable universe
  - (e) Milky Way
23. The object referred to by the textbook as the largest structure known is the Sloan Great Wall, with a length of about \_\_\_\_\_.
- (a) 3000 Mpc      (b) 300 Mpc      (c) 14 GLY      (d) 100 Mpc      (e) 100 kpc
24. What is the meaning of a "closed" universe?

- (a) The universe will expand forever.
  - (b) The universe will someday stop expanding and start to collapse.
  - (c) The universe will stop expanding in an infinite amount of time.
  - (d) The universe is in a steady-state.
  - (e) The universe will disappear into a white hole in time.
25. The cosmic microwave background is important mostly because:
- (a) its detection lead to the discovery of dark matter.
  - (b) its detection opened a new form of radiation to observation.
  - (c) it showed that the universe is open.
  - (d) it showed that the universe is closed.
  - (e) it confirmed a major prediction made by the Big Bang theory.
26. The Big Bang has 3 pillars of evidence: primordial abundances, cosmic expansion, and                     .
- (a) the cosmological principle      (b) neutrinos      (c) a lingering oder
  - (d) the cosmic microwave background      (e) the HR Diagram