

GALAXIES Postgrad Lectures

Homework 1

To be handed in on the 8th December.

1. Why is it impossible for galaxies to form before recombination?
 - a) there is too much mass
 - b) it is too hot
 - c) gravity has less strength at this epoch
 - d) there is no matter
 - e) particles are ionized
2. The first galaxies were made up of stars containing (almost) only H and He. Why?
 - a) the first stars had not formed yet
 - b) the first supernovae had not gone off yet
 - c) H and He are primordial elements
 - d) during nucleosynthesis, heavier elements were not made
 - e) all of the above
3. Why does H gas fall into protogalaxy cores and the dark matter remain in the halos?
 - a) dark matter is lighter than H gas
 - b) gas was created in the core
 - c) gas can interact and lose energy
 - d) dark matter is accreted later
 - e) dark matter is converted into gas in the core
4. Star formation in colliding clouds of H gas occurs in
 - a) the cold centre
 - b) the hot halo
 - c) the shock front
 - d) the heated core
 - e) the dark matter halo

5. The more massive a galaxy, the more stars, and therefore the more supernovae. This means
 - a) the galaxy has less dark matter
 - b) the galaxy has more heavy elements (metals)
 - c) the galaxy has more HDM (hot dark matter)
 - d) the stars are older
 - e) the stars are younger
6. Galaxy mergers tend to make remnants that look like ellipticals. Therefore, ellipticals are most common
 - a) next to spirals
 - b) in the voids between galaxy groups
 - c) in pairs
 - d) in the past
 - e) in dense regions
7. Why should we not be surprised that galaxy collisions were rather common in the past?
 - a) Galaxies moved faster in the past and therefore collided more often.
 - b) Galaxies were larger in the past and therefore collided more often.
 - c) Both (a) and (b).
 - d) The universe was much denser in the past, so its galaxies were much closer together, making collisions much more frequent.
 - e) Because elliptical galaxies are formed by the collision of two spiral galaxies, ellipticals are observed to be more common in the past.
8. If there were dark matter halos without galaxies in them, how could one go about finding them?
9. List the main (recently finished/continuing/soon to be started) nearby galaxy surveys and the wavelength/emission line that they observe? What are their main aims? Why is a deep, all-sky $H\alpha$ survey not sufficient?