

Physics 134 Observational Astrophysics

HW 1

1. Choose your first observing project and form a small team if applicable.
2. Calculate the fraction of a typical galaxy's volume that is taken up by the stars within it.
3. Look up all galaxies within 100 Mly of us. Include mass of galaxy and number of stars.
4. Calculate the fraction of a galaxy taken up by "solar systems". Choose both habitable zone as well as Pluto as typical orbits.
5. Suppose two typical galaxies 'collide' in space. What is the probability that at least one collision of stars will take place during the galactic collision? Hint: this is just an estimation problem, so you will want to make some simplifying assumptions about the geometries and star densities in the galaxies.
6. Suppose there are free protons in a typical galaxy that are gravitationally bound to the galaxy. How much kinetic energy would a free proton have to have in order to escape this gravitational binding energy?
7. Look up the supernova event SN1987A. How did people determine what direction the event came from in the sky?