Astronomy 330 / Galaxies

Problem Set 4
Due: Friday 19 November 2010

Problem 1. Do Chris Mihos's "Cannibal" lab. Be sure to read up on the "physics" section of the lab before you get started. The web page is http://burro.astr.cwru.edu/JavaLab/index.html. Then click on the cannibal lab.

Problem 2. Calculate surface-brightness in solar units for spirals and ellipticals:
   a. Do problem 5.2 in S&G
   b. Do problem 6.3 in S&G

Problem 3. Calculate M/L for ellipticals:
   a. Do problem 6.6 in S&G
   b. Do problems 6.13 and 6.14 in S&G

Problem 4. Parameterize the evolution of stellar populations in galaxies:
   a. Do problem 6.12 in S&G
   b. Estimate which single star best represents the model spectra of a galaxy which makes all of its stars in a single burst of 10^8 years after 10 Myr, 100 Myr, 1 Gyr and 10 Gyr (in Figure 6.18 of S&G) as well as the elliptical galaxy spectrum shown in Figure 6.17.
   c. Now consider Figure 6.19 in S&G. What does this tell you about the validity of a single-star representation of the colors of today's elliptical galaxies? Suppose we extend this conclusion to the model spectra in Figure 6.18. Revise your estimate for the stellar mix at each of the ages given in (b). Present a qualitative and quantitative argument for your choice based on what you know about simple stellar populations, and their evolution with time, Main-Sequence lifetimes, and CMDs of star-clusters.
   d. Tell me how this exercise is relevant for the term project, both generally and specifically. What conclusions from this set of problems can be applied directly to the project calculations?