

# Astronomy 128: Galaxies and Galactic Structure

Week 8, Thursday, March 16

**Topic:** Elliptical Galaxies I: Photometry, Shapes, and Stellar Motions  
(Plus review for the midterm!)

This week, we'll take a look at the other main type of galaxies: ellipticals. They are quite distinct from their spiral counterparts: little to no interstellar gas, usually no organized motion and a very large range of masses (dwarf ellipticals all the way up to cD galaxies). We will examine the photometric projected profiles of ellipticals and what this tells us about the true shape of the galaxies. Spirals seem to follow the Tully-Fisher law; ellipticals have their own relationship: the Faber-Jackson relation and the fundamental plane.

**Break:** Vernon

**Reading:** Read Chapter 6 of Sparke & Gallagher, through Section 6.2.

**Problems:**

1. Come to class with at least one *written* question on the reading.
2. SG 6.3.
3. SG 6.5.
4. SG 6.6.
5. SG 6.7.
6. SG 6.8.
7. We aren't going to go into the dynamics of orbits in elliptical galaxies in great detail, but to get a sense of the types of orbits you find, do Chris Mihos' *Surface of a Section* lab, online at <http://burro.astr.cwru.edu/JavaLab/index.html>. Choose "Applets" in the left panel, then choose "SOS". You'll definitely want to read the "Background" and "Controls" sections (tabs on the left side) before you try to do much with the applet. Start the applet, and then follow the instructions under the "Lab" link on the left. Answer the questions listed there.

8. I'm tempted to give us another paper to read this week, but I think we'll hold off in order to leave some time for review, and possibly do a couple of papers a subsequent week.
9. When you're working out problems dealing with a particular topic, it's easy to lose sight of the big picture. So let's try to step back and see if we can find that picture. For each chapter in Sparke & Gallagher that we've covered so far (up through Chapter 5), list 2–4 important ideas, laws, or concepts. I'll do the same, and we'll aggregate them into a larger list during seminar to help focus your review.
10. The big picture is good, but we need to be able to tackle specific problems as well. Write down one problem that you would put on the midterm exam if you were writing it. Clearly state the problem and whether or not any supplementary material is allowed (e.g. Sparke & Gallagher, integral tables, etc.). Then write out the solution. As above, I'll come up with some problems as well, and we'll aggregate these into a larger list of practice exam problems.

For both of the last two problems, please e-mail me your lists and problems *by sometime Wednesday evening*, i.e. you don't need to turn them in with your written problems on Wed. afternoon. But do send them to me electronically so that I can compile them into a single document. If it's easier to write out your solution by hand, that's fine; don't spend a lot of time typesetting it. You can bring your solution to seminar on Thursday.