

# Astronomy 117

## High Energy Astrophysics

**Instructor:** David A. Williams (office NS2 319, phone 459-3032, e-mail: daw@scipp.ucsc.edu)

**Place:** Earth & Marine Sciences, B210

**Time:** Mondays, Wednesdays and Fridays, 9:30–10:40 am

**Office Hours:** Wednesdays, 1–3 pm, and by appointment. No office hours on April 11, May 2 and May 30. Office hours will end at 2 pm on April 25.

**Books:** The required text for the course is

- *High Energy Astrophysics*, second edition, volumes 1 and 2, by Malcolm S. Longair

**Course materials**, such as homework assignments, homework solutions and handouts will be available at my course web site

<http://scipp.ucsc.edu/~daw/astr117>

### Topics

High Energy Astrophysics is a broad and rapidly evolving field, consisting of the study of high energy processes in astrophysical systems. We study these processes by the radiation they produce which reaches earth, which takes many forms: X-rays,  $\gamma$ -rays, the cosmic rays (atomic nuclei and electrons), *etc.* In this course, we will survey the field and give you some idea of the science being done and how it is done. We will touch on most of the areas in the text, but in a single quarter we will not have time to cover them all as extensively or as deeply as the text does.

### Grading

Your performance in the class will be evaluated on the basis of several homework problem sets (40%), a course project (30%), and a final exam (30%). You should feel free to discuss the homework problems and the course projects with each other (and even to read drafts of each other's projects), but you should write up the problem sets on your own.

### Course Project

I will provide a sign-up list of astronomical objects, both galactic and extragalactic. We will arrange sign-ups so that you each do a project on a different object of your choice (but perhaps not your first choice). You will locate and read three articles about the object in the refereed archival literature and write a summary of the articles. More detail about the course project will be provided in a separate handout.

### Final Exam

The final exam is scheduled for **Thursday, June 14, noon–3 pm**. It will be a comprehensive exam covering the whole course.

## Lecture Schedule

Here is a schedule of lectures and reading for the first two weeks of the quarter.

- April 4, Introduction and Overview—ch. 1; begin X-rays
- April 6, X-rays: Interactions and detection, sec. 2.1, 2.2, 2.4, 4.1, 4.2, 6.1, 6.4, 6.5.1, 7.3
- April 9, X-rays, continued
- April 11, (Hartmut Sadrozinski) Gamma-ray interactions and GLAST, sec. 4.4, 4.5, 6.5, 7.4
- April 13, Detecting very high energy gamma-rays, sec. 4.5, 4.6, 5.4, 5.5, 7.4.4