

Astronomy and Astrophysics 117
Spring 2007
Lecture Schedule and Reading Assignments

Here is a schedule of lectures and reading for the first three weeks of the quarter. The reading assignments are all indicated by chapter or section of *High Energy Astrophysics*, second edition, by Malcolm S. Longair.

Whenever the **first section of a chapter** or **first subsection of a section** is assigned, any material in that chapter or section **before the start of the first section is also included**. For example, the paragraph before section 9.1 is part of the assignment for April 20. Similarly, the assignment for April 23 includes the three paragraphs of section 10.5 before the start of section 10.5.1.

- 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
- April 16, Very high energy gamma-rays, continued
- April 18, Nuclear interactions, sec. 5.1, 5.4, 5.5
- April 20, Cosmic rays, sec. 9.1, 9.3–9.6
- April 23, Solar wind, sec. 10.1–10.3, 10.5.1, 10.5.3, 10.7
- April 25, Particles in \vec{B} and solar ν problem, sec. 11.1, 11.2.1, 7.5, 14.2.1
- April 27, (David Smith) High energy astrophysics of the sun, ch. 12
- April 30, Stellar evolution and nucleosynthesis in stars, sec. 13.3, 14.3
- May 2, (David Smith) High energy astrophysics of the sun, cont., ch. 12 and **handout**
- May 4, Degeneracy pressure, sec. 15.3.1, 15.3.2
- May 7, Chandrasekhar limit, white dwarfs, and neutron stars, sec. 15.3.3, 15.1, 15.2
- May 9, Pulsars, sec. 15.4
- May 11, X-ray binaries and black holes, sec. 14.6, 15.5, 15.6
- May 14, (David Smith) Black holes, continued
- May 16, Accretion, sec. 16.1, 16.2

- May 18, Thin accretion disks, sec. 16.3
- May 21, Effects of magnetic field & accretion from wind, sec. 16.4, pp. 175–176 of sec. 16.5
- May 23, 2nd order Fermi acceleration, sec. 21.1–21.3
- May 25, Shocks, sec. 10.6
- May 30, Particle acceleration in shocks, sec. 21.4
- June 1, (Pablo Saz Parkinson/Enrico Ramirez-Ruiz) Gamma-ray bursts, sec. 16.6 (Although only about a decade old, this section is now very out of date and now known to be mostly wrong. Read it for contrast with what is now known.)
- June 4, Spectral Energy Distributions, non-thermal spectra, superluminal motion*
- June 6, Synchrotron radiation and inverse Compton scattering*
- June 8, Review

*There is no assigned reading corresponding to these lectures. Longair either does not cover the topic, or covers it at level of detail which is difficult to understand without going beyond the scope of this course.