Astro 201 Course Reader

Table of Contents

11. More of Mihalas's "Stellar Atmospheres" (see 2 above). This time it's Chapter 5 on "The Equations of Statistical Equilibrium": what it specifically means to be in "LTE" or "non-LTE" (pp. 106–124).

12. More from Osterbrock's "Astrophysics of Gaseous Nebulae and AGN" (see 6 above). Radiative recombination coefficients (pp. 125–127), plus a clear derivation of Milne's relation between recombination and photoionization cross sections (pp. 128–129).

13. Shu's "Synchrotron Theory: Simple Version" from his textbook, "Physics of Astrophysics, Volume I". Probably my favorite chapter from this textbook. Even includes inverse Compton effects. This will be on the exam (pp. 130–144).

14. A readable introduction to cosmic rays by Mewaldt (pp. 145–147).

15. The cosmic-ray (high-energy proton) energy spectrum (p. 148).

16. A brief introduction to cosmic rays, by Nilsen and Zager who detect them using balloons in the Antarctic. Separate data for protons and He nuclei are given (pp. 149–161).

17. "Physical Processes in Active Galactic Nuclei," by Roger Blandford. Lecture notes from the Saas-Fee school. A self-contained and insightful introduction to synchrotron emission, including a nice bit on polarization; Burbidge's minimum energy argument for synchrotron sources; and Compton and inverse Compton scattering (especially well treated). There is also a fun paragraph for people who don't believe in black holes (pp. 162–193, with the most useful pages 167–179).

18. "A Jet Model for the Broadband Spectrum of XTE J1118+480," by Markoff et al. 2001. Having understood synchrotron radiation, and having gotten the hang of "thinking logarithmically," you should be able to understand how Figure 1 was computed (pp. 194–197).

19. A plot that demonstrates synchrotron-self-Compton scattering from Band & Grindlay 1985 (p. 198).

20. A discussion of the importance of relativistic beaming, the inverse Compton limit, and fast time variability of active galactic nuclei and quasars, by Kellermann (pp. 199–205).

21. Selections from Chamberlain & Hunten's textbook "Theory of Planetary Atmospheres," a lucid introduction to the subject, relevant for disk and stellar atmospheres as well. From the selections photocopied here, I learned Eddington's simple and powerful radiative transfer methods (two-stream and N-stream) for radiative atmospheres in LTE (pp. 205–215), and Chandrasekhar's elegant solution of a scattering atmosphere (pp. 216–230; page 230 I computed using the equations from the book).

22. "Interstellar Masers," lecture notes by Peter Goldreich. The first paragraph should be read by aspiring theorists (pp. 231–285).