The physics of the interstellar medium MN1
Problem set 2 (Macrophysics)
HT 2004

Please solve the following problems. This will give you a bonus of 5% on the final exam, if at least 80% of the problems are solved correctly. Write down every step in your line of thinking and state assumptions etc. The solutions should be handed in by 2004 12 15.

- Problem 1:
  Estimate the downstream Mach number for a strong (adiabatic) shock for an ideal monatomic gas.

- Problem 2:
  Consider a Strömgren sphere of radius $R_S = 10$ pc and internal density $n_e = 10^6$ m^{-3}, and with a central ionizing source of 10^{49} photons s^{-1}.
  (a) How long will it take to become neutral once the ionizing star has switched off?
  (b) Suppose that the sphere expands at a rate equal to the sound speed in a fully ionized 10^4 K gas. How long will it take to expand to a size of 100 pc?

- Dyson & Williams Chapter 6: Problems 2 and 4

- Choose three problems from Chapter 7 and two problems from Chapter 8 of Dyson & Williams.