

## Homework problems due Friday, January 27

Hint: For Problems 7 and 8, start with Equation (1.53).

### **Problem 7.**

Calculate accurately the mean lifetime of the 2p state of atomic hydrogen.

### **Problem 8 (*revised*)**

(a) Estimate the decay rate for a nuclear gamma decay .

(b) Compare the result to the "Weisskopf estimate",

$$\Gamma_W = (0.068 \text{ eV} / \hbar) A^{2/3} (\Delta E / \text{MeV})^3 .$$

(c) Estimate the mean lifetime, for  $A = 40$  and  $\Delta E = 1 \text{ MeV}$ .

### **Problem 9**

Calculate the total cross section for Thomson scattering, and express the result in millibarns (mb).

### **Problem 10**

“In fact, it can easily be demonstrated that it takes a photon emitted in the solar core many thousands of years to fight its way to the surface because of Thomson scattering.”

Prove it.