

Physics 125c
Problem set number 6
Due Wednesday, May 12, 2004

Notes about course:

- There is a web page for this course, which should be referred to for the most up-to-date information. The URL:
<http://www.hep.caltech.edu/~fcp/ph125/>

READING: Read the “Identical Particles” course note.

PROBLEMS:

20. Let’s try an example application of our helicity formalism for angular distributions. Consider the magnetic dipole transition in which we radiatively excite a hydrogen atom from its ground 1S_0 state to the 3S_1 state, followed by subsequent decay back to the ground state via emission of a photon. That is, we consider the scattering process:

$$\gamma + ^1S_0 \rightarrow ^3S_1 \rightarrow \gamma + ^1S_0. \quad (14)$$

This is an electromagnetic interaction, hence, parity is conserved. For unpolarized scattering, what angular distribution do you expect for the scattering angle between the initial and outgoing photon? Is your result valid for the laboratory frame, in which the initial hydrogen atom is at rest?

21. Do exercise 1 of the “Identical Particles” course note.
22. Do exercise 2 of the “Identical Particles” course note.
23. Do exercise 3 of the “Identical Particles” course note.