Physics 615 Fall, 2013

Homework #4 Due: Oct. 4 at 3:00

Project #1 Due: Oct. 11 at 3:00

Homework #4: [5 pts] Do problem 3.2 from Peskin and Schroeder.

This is a small problem and just a partial homework for this week. The real work is to get started on the project, even though it is not due until next week.

Project #1:
The project is a rather involved problem from the book. It is to be done in groups:

- Group A: Feld, Laflotte, Ye
- Group B: Gomez, Kolchmeyer, Han
- Group C: Kyriacou, Nathan, Zhu, (Franks)

The person in parenthesis is not registered in the course, so any work he does is voluntary.

The assignment: Do problem 3.4 from Peskin and Schroeder.
Note, especially on part (e):

Start with an expression for $\chi(x)$ that looks like 3.99 for the Dirac field, but with $b_{\vec{p}}^{s\dagger}$ replaced by $a_{\vec{p}}^{s\dagger}$, because for this Majorana field the antiparticles are the particles themselves. Also note that u and v are now only two component spinors. It will be easiest to guess the anticommutation relations for a and $a^\dagger$, and show that the fields χ and $\chi^\dagger$ satisfy the correct anticommutation relations. You will need to find the correct expressions for $u^s(\vec{p})$ and $v^s(\vec{p})$ from the equations of motion, and use other things you derived for the first four parts.

The group is to work collectively on the project, and present one copy of its work. It is to be written up consistently, coherently, and neatly, on a computer, preferably in TeX or LaTeX. Each member is responsible for proofreading before submission. You need to make a clear presentation, as if you were teaching the material, not just show you can get the answer.