

Week 9 (due March 12)

1. (20 pts). Consider Dirac fermions coupled to a background scalar field $\phi(x)$ via the interaction $\mathcal{L}_{int} = g\bar{\psi}\psi\phi$. Compute the low-energy effective Hamiltonian for the nonrelativistic Fermi field describing the electron to order p^2/m^2 .
2. (20 pts). The same thing, but for the interaction $\mathcal{L}_{int} = ig\bar{\psi}\gamma^5\psi\phi$.