Warning: these notes have been translated from the normal metric to the Peskin metric \((+, -, -, -)\).

Third (not-counting the extra-credit one) homework assignment:

(1) In the theory of a charged scalar field \(\psi\) interacting with a neutral scalar field \(\phi\) via the interaction Hamiltonian density

\[
\mathcal{H}_I = g \psi\dagger(x) \psi(x) \phi(x)
\]  

compute to lowest order in the coupling constant \(g\) the amplitude \(\langle p'_1 p'_2 | U(\infty, -\infty) | p_1 p_2 \rangle\) for the scattering of two charged particles.

(2) In the same theory, compute to lowest order in the coupling constant \(g\) the amplitude \(\langle p'_1 p'_2 | U(\infty, -\infty) | p_1 p_2 \rangle\) for the scattering of a charged anti-particle by a neutral boson.