0) Class tomorrow @ 10AM in RTHL 103

2) Final Exam Pickup in my office, 316, Friday Dec 5 at Noon

\[ \text{Dirac Spinor } \Psi, \quad \mathcal{L} = \bar{\Psi} \left( i \gamma - m \right) \Psi \]

\[ \text{Dirac Eqn} \quad (i \gamma - m) \Psi = 0 \]

The propagator is a 4x4 matrix:

\[ S_{x-y} = \langle 0 | T \Psi(x) \bar{\Psi}(y) | 0 \rangle = \int \frac{d^4 p}{(2\pi)^4} \frac{i \rho(x-y) \gamma^\mu}{p^2 - m^2 + i\epsilon} \]

is the inverse of the Dirac operator:

\[ (i \gamma - m) S_{x-y} = \delta(x-y) \]

Derived using expansion of \[ \Psi \] in terms of \[ a_{p,s} \] and \[ b_{p,s} \] and using the path integral:

\[ Z[\gamma, \bar{\gamma}] = \int \mathcal{D} \Psi \mathcal{D} \bar{\Psi} \exp \left\{ i \int d^4 x \bar{\Psi} \left( i \gamma - m \right) \Psi + \bar{\gamma} \gamma + \bar{\gamma} \gamma \right\} \]

\[ = \exp \left( \int d^4 x \int d^4 y \bar{\gamma}(x) S(x-y) \gamma(y) \right) \]

We can extract coupling's by taking functional derivatives w.r.t. \[ \gamma \] and \[ \bar{\gamma} \].
Con. fns with \( \tilde{\Psi}(x) \rightarrow -\frac{1}{i} \frac{\delta}{\delta \tilde{\eta}(x)} \) \( \Psi(y) \rightarrow \frac{1}{i} \frac{\delta}{\delta \tilde{\eta}(y)} \)