8.811 Particle Physics
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Assignment 2
Due in class on Oct 4, 2005

1. Q&L 5-3, using the rotational matrix of Assignment 1-2. Tabulate the all four helicity eigenspinors of both the electron and an positron for $\lambda = 1/2$ and $-1/2$ respectively. Keep then handy for future usages.

2. Q&L 5-9, the completeness relations.

3. Q&L 5-15, relating the helicity eigenstates and the chirality eigenstates of a positron at very high energies.

4. Express the helicity eigenstates of an electron with mass m and energy E, in terms of its chirality eigenstates by keeping the first order term in m/E, i.e. for the case when m/E is small but not entirely negligible.

5. Use the above results to obtain the ratio of the branching ratio of pi --> e + neutrino to that of pi -->Mu + neutrino, and for the ratio of the branching ratio of K --> e + neutrino to that of K -->Mu + neutrino.