

8.811 Particle Physics
Min Chen

Fall, 2005

Lectures

Reading:

Polarization, propagator, Interaction matrix, and cross sections

Q&L Chap. 6
& C.P. Chap. 2

Weak Interactions

Q&L Chap. 12

Unitarity bounds,

Q&L Chap. 15.6,

and references there. Elementary Particle Physics by Murihead Chap. 7.5.

Violation of Unitarity bounds, with predictions for “new” particles and their interactions,

Lecture notes

Assignment 3

Due Oct. 13, 2005

1. Q&L 12.21, draw the Feynman diagrams and label the couplings to all interaction vertices.
2. Q&L 12.22, draw the Feynman diagrams and label the couplings to all interaction vertices and compute the phase space factors.
3. Q&L 12.23, draw the Feynman diagrams and label the couplings to all interaction vertices.
4. Show that the charged weak interaction of 6 quarks could be CP invariant only if the mixing matrix is real.
5. Use the Feynman Rules of P. 149 of Q&L to define the interaction matrix element and to compute the cross section of a pair of (Right Handed) positron-(Left Handed) electron annihilated via a virtual photon into a muon pair at angle θ respect to the original electron direction.
6. Show that the same angular dependence of problem 5 can be obtained using the rotational operator defined in problem 2.6 in Q&L.