

Physics 131

Spring 2009

Particle Physics Seminar #3

Textbook: Griffiths - Introduction to Elementary Particles

Website: (all notes referred to below are on web site)

http://chaos.swarthmore.edu/courses/Phys093_2009/index.html

Readings:

REQUIRED: Griffiths - Chapter - 4
01_Ch19_2ndQuant - 2nd Quantization

Find readings that you like from:

GroupTheoryA0
GroupTheoryA1
GroupTheoryB0
GroupTheoryC0
Lie
Lie_Stuff
LPSQFT
Cons_Laws_Symm

My lectures on group theory will come from various parts of these documents.

Topic: Symmetries and Group Theory

Professor Lecture Topic(s): Group Theory(start)

Problems:

Griffiths 4-04 Triangle group
4-04 Symmetry group
4-06 Rotations
4-07 $O(2)$
4-10 Beta decay
4-11 Angular momentum values
4-13 Spin = 2
4-14 Adding spins

Extra problem 3 - A Ξ^0 can decay by $\Xi^0 \rightarrow \Sigma^+ + e^- + \bar{\nu}_e$. Initially the Ξ^0 is at rest with its spin pointed in the +z-direction. The decay products are produced with no orbital angular momentum. The $\bar{\nu}_e$ is

produced going on the $-z$ -direction, and the electron's spin is measured to have $m_s = +1/2$. What is m_s for the Σ^+ ?

Extra Problem 4 - A Δ^+ particle decays by the strong interaction either by $\Delta^+ \rightarrow p + \pi^0$ or $\Delta^+ \rightarrow n + \pi^+$. What fraction of the time does the $\Delta^+ \rightarrow p + \pi^0$ decay occur?

Extra Problem 5 - Prove that if two null 4-vectors V^μ and W^μ are orthogonal, they must be parallel.