

UNIVERSITY OF CALIFORNIA, SANTA BARBARA
Department of Physics

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Physics 229A

Winter 2007

Gauge Theories

ASSIGNMENT #5

Due Thursday, February 15, 2007

1. Derive the relations between the oblique parameters S , T , and U and the chiral lagrangian parameters α_1 , β_1 , and α_8 given in class.
2. Derive the tree-level expression for A_{LR}^e given in class.
3. In the $SU(5)/SO(5)$ little Higgs model,
 - a) derive the transformation laws for the Higgs doublets under $SU(3)_{1,2}$;
 - b) show that either such unbroken symmetry prevents a Higgs mass; and
 - c) show that the gaugings of $[SU(2) \times U(1)]_i$ break one or the other of these symmetries.

Thus, the Higgs mass must be proportional to $g_{(1)}g_{(2)}$.

Extra credit

Working with an explicit momentum-space cutoff prescription, derive the standard model formula for the quadratically-divergent one-loop contributions to δM_H^2 , given in class.