

UNIVERSITY OF CALIFORNIA, SANTA BARBARA  
Department of Physics

Physics 221C

Quantum Field Theory

Spring 2007

Prof: Joe Polchinski

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Office hours: Kohn 2319, Th 3:30-4:30 (or email/see me after class to set up a time)

TA: Richard Eager

ASSIGNMENT #8

Due: Friday, June 1, 5pm in TA's mailbox

1. Sred. 87.5

2. Calculate the decay rate of  $W^+$  to  $u\bar{d}$ ,  $u\bar{s}$ ,  $u\bar{b}$ , and the decay rate of  $Z^0$  to  $u\bar{u}$ ,  $d\bar{d}$ ,  $d\bar{s}$ . Ignore the quark masses.

3. The effective Lagrangian that we found for the pion has many applications. Consider it in the form 83.13, where you can ignore the ... terms for present purposes. In *two* spacetime dimensions,  $g = f_\pi^{-1}$  is dimensionless. Calculate its  $\beta$ -function and integrate to get the  $\mu$ -dependence of  $g$ .