Problem Set 5 — due Mar. 11

1. (5 points) Problem 4.19 of Bettini.

2. (5 points) Evidence has been reported both for and against the existence of a particle with strangeness +1, charge +1, and baryon number +1. What is the simplest quark assignment such a particle could have? What isospins are possible in principle?

3. (10 points) (a) From the Particle Data Group (PDG), the excited charmed meson $D^{*+}(2010)$ has a branching ratio of $30.7 \pm 0.5\%$ to $D^+\pi^0$, and $67.7 \pm 0.5\%$ to $D^0\pi^+$. Use isospin and Clebsch-Gordon coefficients to explain the ratio of the two branching ratios. (b) The analogous charmed-strange meson $D_s^{*+}(2112)$ has a branching ratio to $D_s^+\pi^0$ which is only 5.8%. It is dominated by the electromagnetic decay to $D_s^+\gamma$. Explain.

4. (5 points) From the PDG, he branching fraction of the ρ to $\eta\pi$ is known to be less than 6×10^{-3}. Why is it so small?

5. (10 points) Problem 4.26 of Bettini.