HW #3 (129A), due Oct 11, 4pm

1. Which of the following processes are allowed by the strong interactions? If not allowed, what conservation law forbids the process?

(a) $p \to e^+\pi^0$

(b) $\mu^- \to e^-e^-e^+$

(c) $pp \to pn\pi^+$

(d) $pn \to ppp\bar{n}$

(e) $\pi^+p \to \Lambda K^+$

(f) $np \to \Sigma^0 K^+$

(g) $e^+e^- \to pn$

(h) $e^-p \to \pi^0 n$

(i) $\pi^-p \to K^0 n$

(j) $\pi^0 \to K^+K^-$

2. The mass of the charged pion was measured to be 140 MeV/c^2. What is the range of the force mediated by it?

3. Solve Problem 2.1 of Cahn–Goldhaber.

4. Using "Table of Isotopes," by Richard B. Firestone, Wiley-Interscience, identify low-lying levels in ^{14}C, ^{14}N, and ^{14}O that correspond to $I = 0$ and $I = 1$ multiplets.