

Physics 225a Problem Set 2

Harry Nelson

due Monday, Oct. 13 in class

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1. We've talked about the decay $\pi^- \rightarrow \mu^- \bar{\nu}_\mu$ in class. the K^- is a meson that consists of a strange quark and an anti-up quark. Neglecting phase space and related factors, estimate the ratio:

$$R = \frac{\Gamma(K^- \rightarrow \mu^- \bar{\nu}_\mu)}{\Gamma(\pi^- \rightarrow \mu^- \bar{\nu}_\mu)}$$

- . Also, go to the PDG Website (or your RPP) and calculate this ratio from the data. As you'll see, the phase space factors have considerable influence.
 2. Draw the Feynman diagrams for the semileptonic decays $D^0 \rightarrow K^- e^+ \nu_e$ and $D^0 \rightarrow \pi^- e^+ \nu_e$, where the D^0 is a meson consisting of a c-quark and an anti-up quark. Again neglecting phase, space, what do you estimate for the ratio of these partial widths?
 3. A famous second-order weak transition is that from a K^0 (which consists of an anti-s quark and a d quark) to a \bar{K}^0 quark. Draw a Feynman diagram for this transition.
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