P424 Assignment 4

Due Monday, Feb. 9

1) Neutral kaon beams

Suppose you have a monochromatic beam of K^0 mesons produced at position $z = 0$. They have a momentum of 40 GeV parallel to $\hat{z}$. (Never mind that real kaon beams aren't quite so ideal.)

At what distance do you expect to see the K^0 content of the beam go through its first minimum? At this point what fraction of the kaons are in the $\overline{K}^0$ state?

2) Quark model

Explain why the J^{PC} combinations 0^{+-} and 1^{-+} are incompatible with being $q\bar{q}$ states.

3) Strange physics

(a) Could the phenomenon of strangeness oscillations exist without CP violation?

(b) Why are strangeness oscillations not seen in the excited neutral strange mesons $K^{*0}(892)$ and $\overline{K}^{*0}(892)$?