

Midterm Exam (129A), Oct 31

1. Explain (1) why color degrees of freedom was introduced, using one baryon wave function of your choice as an example, and (2) what is the most convincing evidence for the color degrees of freedom we have now. (At most half a page each. 10 points each.)
2. Estimate the decay rate $\Lambda^0 \rightarrow pe^- \bar{\nu}_e$, and compare to the data. (20 points.)
3. Do the following processes occur? If yes, draw the Feynman diagram for the process. If not, quote the reason. (3+3 points each)
 - (a) $\mu^- \rightarrow e^- \nu_e \bar{\nu}_e$
 - (b) $pn \rightarrow \Lambda^0 K^+ n$
 - (c) $e^+ e^- \rightarrow b \bar{b}$
 - (d) $\omega^0 \rightarrow \pi^0 \pi^0$
 - (e) $K^+ \rightarrow \pi^0 \mu^+ \nu_\mu$
 - (f) $\Sigma^0 \rightarrow K^- p$
 - (g) $p \rightarrow \mu^+ \pi^0$
 - (h) $\bar{\nu}_e p \rightarrow e^+ n$
 - (i) $\Delta^{++} \rightarrow p \pi^+$
 - (j) $e^+ e^- \rightarrow \mu^+ \nu_\mu$