

Questions from Nuclear Lunch presentation, October 13, 2010

1. What strong interactions are used to produce a beam of neutral kaons? Is the resulting beam an eigenstate of CP? **Daniel S.**
2. Why does the ε in $K_L = K_2 + \varepsilon K_1$ parameterize CP violation? How is this related to the statement that the K_L “oscillates” between different CP eigenstates? Does this oscillation have an external cause? **Bijaya**
3. How is it that the decay of the K_L and K_S (or the neutral B mesons) allows us to detect those oscillations? In particular, why is it that the K_1 has a much shorter lifetime than the K_2 ? **Anthony**
4. Why does this experiment measure an asymmetry of positively-charged and negatively-charged muon pairs, as opposed to just counting the fraction of positively-charged muon pairs (say) that are produced? **Harsha**
5. How do you backtrack from the particles detected in the detector to determine what their “parent” particle was? How does this help identify the events where a B-meson decayed to a muon? **Sean**
6. What are some of the methods that the D0 collaboration uses in order to ensure that they have removed the background from their asymmetry? **Dilu**
7. What is the CKM matrix? How is it linked to CP violation? Why is a third generation of quarks necessary for that? **Ken**
8. Are there other experiments searching for CP violation? **Shamim**
9. What does it mean when we say that “parity is maximally violated in the weak interaction”? **Youngshin**
10. Since weak interactions play such a key role here how confident are we that our understanding of them is correct? **Chen**
11. How does the existence of neutrino mass affect the statements made in the talk regarding left-handed neutrinos? **Azamat**