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 \( \epsilon \) in \( K_L = K_2 + \epsilon K_1 \) 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