
chapter 4 (lecture 5)

- 9) From the time dependent CP asymmetry in the decay $B^0 \rightarrow J/\psi K_S^0$ we can measure the CKM angle β . We now consider the decay $B^0 \rightarrow \pi^+\pi^-$.
- (a) Draw the decay diagram for $B^0 \rightarrow \pi^+\pi^-$.
 - (b) Show that $|\pi^+\pi^-\rangle$ is a CP eigenstate.
 - (c) What is the CP-eigenvalue of $|\pi^+\pi^-\rangle$?
 - (d) The decay $B^0 \rightarrow \pi^+\pi^-$ is the result of interference between a direct decay amplitude and mixing-plus-decay amplitude. Draw the diagrams for both amplitudes.
 - (e) What are the weak phases of each amplitude?
 - (f) What is the weak phase difference between the amplitudes?
 - (g) Show that you effectively measure the CKM angle α with this decay.