HEPP-CPV-project

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I. INTRODUCTION

Short intro here

II. $\hat{P}$, $\hat{C}$ AND $\hat{C}\hat{P}\hat{T}$

III. CP VIOLATION

CP violation was first observed in the mixing of neutral K-mesons by Christenson, Cronin, Fitch and Turlay in 1964 [1]. They observed the $\hat{C}\hat{P} = -1$ state K_L^0 decaying to 2 pions, a state with $\hat{C}\hat{P} = 1$. Although the fraction of K_L^0 decays violating $\hat{C}\hat{P}$ in this way is tiny, the discovery was significant.

IV. KAON MIXING

A. Neutral Kaon Mixing and $\hat{C}\hat{P}$V

As mentioned $\hat{C}\hat{P}$V was first observed in the neutral kaon system. Both direct and indirect $\hat{C}\hat{P}$V have been observed but is almost entirely dominated by the indirect process [Zeng, need better reference]. Essential to these mechanisms is the mixing between the neutral Kaon and its anti-particle corresponding to the states $\langle K^0|$ and $|\hat{K}^0\rangle$. These have quark compositions of $d\hat{s}$ and $s\bar{d}$, respectively.

V. CKM MECHANISM

Appendix A: Appendix

Difficult calculations in here.

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[1] "Evidence for the 2π Decay of the K_2^0 Meson" - J. H. Christenson, J. W. Cronin, V. L. Fitch, and R. Turlay (1964) Phys. Review letters, vol. 13, issue 4