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eta_c mixing effects on charmonium and B meson decays

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We include the η_c meson into the η - η' -G mixing formalism constructed in our previous work, where G represents the pseudoscalar gluball. The mixing angles in this tetramixing matrix are constrained by theoretical and experimental implications from relevant hadronic processes. Especially, the angle between η_c and G is found to be about 15° from the measured decay width of the η_c meson. The pseudoscalar glueball mass m_G , and the pseudoscalar densities $m_{qq,ss,cc}$ and the U(1) anomaly matrix elements associated with the mixed states are solved from the anomalous Ward identities. The solution $m_G \approx 1.4$ GeV obtained from the η - η' -Gmixing is confirmed, while m_{qq} grows to above the pion mass, and thus increases perturbative QCD (PQCD) predictions for the branching ratios $Br(B \to \eta' K)$. We then analyze the η_c -mixing effects on charmonium magnetic dipole transitions, and on the $B \rightarrow \eta^{(\prime)} K_S$ branching ratios and CP asymmetries, which further improve the consistency between theoretical predictions and data. A predominant observation is that the η_c mixing enhances the PQCD predictions for $Br(B \to \eta' K)$ by 20\%, but does not alter those for $Br(B \to \eta K)$. The puzzle due to the large $Br(B \to \eta' K)$ data is then resolved.

Presenter: Prof. LI, Hsiang-nan (Academia Sinica) **Session Classification:** Parallel: P2