

Higher-Order Electroweak Contributions to Indirect CP Violation

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The parameter $\epsilon^{\prime\prime}$ is an important measure of the imbalance between matter and antimatter in the neutral kaon (K^0 and $\bar{K}^0$) system. In particular, $\epsilon^{\prime\prime}$ provides a highly sensitive probe of new physics and plays a critical role in the global fit of the Cabibbo-Kobayashi-Maskawa matrix. As one of the first discovered sources of CP violation, it has been extensively measured in experiment to per-mil precision. The theoretical calculation of $\epsilon^{\prime\prime}$, however, has historically been plagued by large perturbative errors arising from charm-quark corrections. These errors were larger than the expected magnitude of higher-order electroweak corrections in perturbation theory, rendering these contributions irrelevant. Recently, it was discovered that a simple re-parameterization of the effective Hamiltonian drastically reduces perturbative errors, making these higher-order electroweak calculations worth-while. We present the next-to-leading-logarithm electroweak contributions to $\epsilon^{\prime\prime}$.

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