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Status of chiral-scale perturbation theory

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We observe that flavor current conservation constrains the structure of chiral-scale perturbation theory ChPT_{sigma}. This theory addresses the disagreement between experiment and lowest order chiral SU(3) x SU(3) perturbation theory (ChPT₃) for amplitudes involving the f₀(500) resonance and O(m_K) extrapolations in momenta. In ChPT_{sigma}, it is assumed that 3-flavor QCD has an infrared fixed point where the chiral condensate induces nine Nambu-Goldstone bosons: pi, K, eta and a QCD dilaton sigma which we identify with f₀(500). In the leading order of ChPT_{sigma}, dilaton-pole dominance explains the Delta I = 1/2 rule in nonleptonic K-decays. The effect of the simplification noted above is that the theory becomes more predictive for the decays sigma -> pi pi and sigma -> gamma gamma and hence for the sigma NN coupling.

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