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Estimate of $\langle\bar{q}q\bar{q}q\rangle$ from the V-A Current-Current Correlator[1]
TRANG NGUYEN, PETER TANDY, Kent State University — In QCD, the difference of the current-current correlators for vector and axial vector currents, in a color singlet and flavor non-singlet channel, is zero to all orders in perturbation theory if the quarks are massless. As an example of the efficiency of this so-called V-A correlator in probing nonperturbative phenomena, its leading ultraviolet term is proportional to the scalar 4-quark condensate $\langle\bar{q}q\bar{q}q\rangle$. This condensate is a key ingredient in QCD sum rule analyses of hadronic properties and, in the absence of independent information, it is often assumed that vacuum saturation holds, namely $\langle\bar{q}q\bar{q}q\rangle \approx \langle\bar{q}q\rangle^2$. We describe here an independent estimate based upon direct evaluation of the current-current correlators within a ladder-rainbow truncated model of QCD. Our results indicate that $\langle\bar{q}q\bar{q}q\rangle$ is significantly larger than what vacuum saturation would suggest.

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