Contribution ID: **91** Type: **not specified**

Flavor quark and meson mixings from vacuum polarization

Friday, September 27, 2024 9:40 AM (40 minutes)

By considering a quark-antiquark interaction mediated by one (non perturbative) gluon exchange, standard techniques are applied to derive effective interactions between meson fields, that are arranged in $U\left(N_f\right)$ flavor multiplets, and constituent quark currents. A large quark mass (and / or gluon effective mass) expansion of the quark determinant leads to a wide variety of effective quark-antiquark / meson interactions. Among them, second order meson mixing interactions and third order three meson interactions will be presented being responsible for different effects. Meson (flavor) mixing effects arise for non-degenerate quark masses, being somewhat similar to the mixings obtained by 't Hooft determinantal interactions. Sixth order quark interactions break $U_A(1)$ symmetry and they lead to three-meson interactions that also undergo flavor mixings. Some phenomenological consequences are discussed.

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