Effective chiral Lagrangian from the instanton vacuum

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Abstract

We investigate the effective chiral Lagrangian [1] to order $O(p^4)$ from the instanton vacuum. Starting from the low-energy QCD partition function from the instanton vacuum [2], one can derive the effective chiral action which contains the momentum-dependent quark mass. Regarding the momenta of the pseudo-Goldstone bosons and their masses as small parameters, we expand the effective chiral action with regard to the derivative of the pseudo-Goldstone fields [3] and current quark mass, so that we obtain the effective chiral Lagrangian to order $O(p^4)$. Using three different types of the form factors, we determine the low energy constants L_i $(i = 1, \cdots 10)$, H_1 and H_2. We also examine the dependence of the low energy constants on the only parameter M_0 and on different form factors to show that the results are mildly dependent on them. The results are in a good agreement with the phenomenological data. In addition, we discuss about the upper bound of the sigma meson [4], using the present results.

References

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