Flavor Physics workshop 2022 (FPWS2022)

Contribution ID : 36

Loop-diagramatic evaluation of QCD θ parameter \\ and its application to the left-right symmetric model

Wednesday 09 Nov 2022 at 17:20 (00h20')

Content :

In this paper, we formulate radiatively induced QCD θ parameters through a loop-diagramatic approach. This method should be more robust derivation compared to an ordinary one: $\theta= \text{arg}\, \text{det} (M_u M_d)$, where M_q is a loop-level quark mass matrix. For the application, we investigate the radiatively induced θ parameter in the minimal left-right symmetric model. We analytically confirmed an old result: two-loop induced θ parameter, corresponding to one-loop corrections to the quark mass matrices, completely vanishes. Furthermore, we estimate the size of a non-vanishing radiative θ parameter at three-loop level. We found that the induced neutron electric dipole moment can be smaller than the current experimental bounds.

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Session classification : Presentations

Track classification : --not yet classified--

Type : --not specified--