

EFT tools to probe CP-violating axion-like particles

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CP-violating probes are among the most promising and yet relatively unexplored ways to look for Axion-like particles (ALPs) and to investigate their phenomenology.

Starting from the most general dimension-5, $SU(3)_c \times U(1)_{em}$ invariant effective Lagrangian for a CP-violating ALP at the electroweak (EW) scale, we discuss two relevant phenomenological frameworks.

In the first one, the impact of heavy ALPs ($m_a \gg 1$ GeV) on low-energy CP-violating observables is analyzed in detail.

In the second one we rather consider lighter ALPs ($m_a \ll 1$ GeV). In this case, QCD can no longer be treated perturbatively and the CPV interactions of ALPs are included in a chiral perturbation theory setup.

Given the resemblance between our setup and the HEFT one, where the Higgs field is treated as a singlet, parallels between the two scenarios are drawn.

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