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Small Instanton-Induced Flavour Invariants and the Axion Potential

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Small instantons can increase the axion mass, due to an appropriate modification of QCD in the ultraviolet (UV), in a way where the axion still solves the strong CP problem. However, if any CP violation is present in UV theories where small instanton effects are enhanced, the minimum of the axion potential will be shifted, destroying the axion solution strong CP problem. In this talk, I will first introduce the use of flavour invariants to capture CP violation in the Standard Model Effective Field Theory (SMEFT). I will then show that these CP-breaking SMEFT flavour invariants naturally arise in the instanton computation of the shifted minimum of the axion potential. Finally, I will present how the invariants can be used to make statements about the way CP-violating SMEFT operators can enter in instanton computations and how the invariants provide a classification of the leading effects of all possible SMEFT operators.

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