



Contribution ID: 52

Type: **not specified**

Small instanton-induced flavor invariants and the axion potential

Tuesday 15 April 2025 15:00 (15 minutes)

Small instantons can enhance 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, besides increasing the axion mass, small instantons can also enhance any CP violation present in the theory, which can shift the minimum of the axion potential, putting the the axion solution strong CP problem at risk. In this talk, I will first introduce the use of flavour invariants to capture CP violation in the Standard Model Effective Field Theory (SMEFT) and how they naturally arise in the instanton computation. Finally, I will present how the invariants can be used to make statements about CP-violation in small instanton scenarios. Besides this, I will also explore these effects to the rest of the axion interactions, namely in regards to the couplings with fermions.

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Session Classification: Session 7 - Astroparticle Physics

Track Classification: Talk