



Contribution ID: 144

Type: **Parallel session talk**

The strong CP problem, the infinite volume limit, and cluster decomposition

Thursday 29 July 2021 11:10 (20 minutes)

While CP violation has never been observed in the strong interactions, the QCD Lagrangian admits a CP-odd topological interaction proportional to the so called theta angle, which weighs the contributions to the partition function from different topological sectors. The observational bounds are usually interpreted as demanding a severe tuning of theta against the phases of the quark masses, which constitutes the so-called strong CP problem. In this talk we challenge this view and argue that in an infinite spacetime the theta angle drops out of correlation functions, so that it becomes unobservable and the CP symmetry is preserved. We arrive at this result either by using instanton computations or by constraining the dependence of the partition function on the spacetime volume and the fermion masses by imposing cluster decomposition and compatibility with the index theorem. We further show that in large but finite spacetime volumes, cluster decomposition can be satisfied up to volume-suppressed corrections without the need to sum over topological sectors, and the resulting partition functions lead again to no CP violation.

First author

Carlos Tamarit

Email

carlos.tamarit@tum.de

Collaboration / Activity

Technical University of Munich

Authors: TAMARIT, Carlos (Technische Universität München); Prof. GARBRECHT, Bjoern (TUM); Dr AI, Wen-Yuan (UC Louvain); Mr CRUZ, Juan S (TUM)

Presenter: TAMARIT, Carlos (Technische Universität München)

Session Classification: T11: Quantum Field and String Theory

Track Classification: Quantum Field and String Theory