ID de Contribution: **110** Type: **Poster**

Approaching small- and large-box regimes in field theory

lundi 13 septembre 2021 16:03 (1 minute)

We propose to investigate in detail how field theory behaves in restricted spaces. To do so, we consider a parametric representation of Feynman amplitudes, which allows us to discuss the behavior up to all orders in a perturbative expansion and extract consequences valid in a global setting. As a first step, we employ periodically compactified spaces and consider a scalar field theory. We show two valid and equivalent representations: a large-box representation (best suited near the bulk limit) and a small-box representation (best suited near the limit of dimensional reduction). In the small-box regime, we discuss the approach to dimensional reduction and show how it differs from a static-mode approximation.

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Classification de Session: Poster