

Abstract

We present a stringy realization of quantum field theory ensembles in $D \leq 4$ spacetime dimensions. This provides a UV completion of a recent proposal by Marolf and Maxfield that there is a high-dimensional Hilbert space for baby universes, but one that is compatible with the proposed Swampland constraints of McNamara and Vafa. This is possible because our construction is really an approximation that breaks down both at short distances, but also at low energies for objects with a large number of microstates. The construction thus provides an explicit set of counterexamples to various claims in the literature that holographic and effective field theory considerations can be reliably developed without reference to any UV completion. Based on joint work with A.P. Turner and X. Yu in hep-th/2111.06404.