

Scalar fields in non-commutative spaces

Abstract content

We present a non-perturbative study of the $\lambda \phi^4$ model in 2- and 3-dimensional non-commutative spaces. The mapping onto a Hermitian matrix model enables the treatment by numerical simulations. A new phase occurs where translation symmetry is spontaneously broken, so that stripe patterns dominate. In $d=3$ we show that in this phase the dispersion relation is deformed in the IR sector, in agreement with the property of UV/IR mixing. In $d=2$ this “striped phase” also occurs, and we demonstrate that it persists in the simultaneous limit to the continuum and infinite volume (“double scaling limit”). Due to the non-locality of this model, there is no contradiction with the Mermin-Wagner Theorem.

Summary

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