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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 noncommutative 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 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

Primary author(s): Dr. BIETENHOLZ, Wolfgang (ICN, UNAM)
Co-author(s): Mr. MEJIA DIAZ, Hector (Instituto de Ciencias Nucleares, UNAM)
Presenter(s): Dr. BIETENHOLZ, Wolfgang (ICN, UNAM)