

Raimar Wulkenhaar
University of Münster, Germany

A solvable quantum field theory in 4 dimensions

We show that the quartic matrix model with an external matrix is, in the large- N limit, exactly solvable in terms of the solution of a non-linear integral equation. The interacting scalar model on four-dimensional noncommutative Moyal space is of this type. The large- N limit restores Euclidean invariance and thus defines Schwinger functions of a 4D Euclidean quantum field theory. Momentum dependence and exact solution support the conjecture that these results are induced by a hidden integrable model. The remaining obstacle to construct a 4D Wightman quantum field theory is reflection positivity. We have numerical evidence and partial analytic proofs for reflection positivity of the 2-point function.