High Energy Physics - Theory

Propagators and Matrix Basis on Noncommutative Minkowski Space

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We describe an analytic continuation of the Euclidean Grosse-Wulkenhaar and LSZ models which defines a one-parameter family of duality covariant noncommutative field theories interpolating between Euclidean and Minkowski space versions of these models, and provides an alternative regularization to the usual Feynman prescription. This regularization allows for a matrix model representation of the field theories in terms of a complex generalization of the usual basis of Landau wavefunctions. The corresponding propagators are calculated and identified with the Feynman propagators of the field theories. The regulated quantum field theories are shown to be UV/IR-duality covariant. We study the asymptotics of the regularized propagators in position and matrix space representations, and confirm that they generically possess a comparably good decay behaviour as in the Euclidean case.

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