Abstract

In this small contribution to theoretical knowledge we will study the problem of trying to confine a system described by a bidimensional noncommutative field theory. While a curve in commutative coordinates can be defined without difficulty, the uncertainty principle that introduces noncommutativity $\delta\hat{x}^1\delta\hat{x}^2 \geq \theta$ means that at small scales ($\sim \theta$) the curve becomes *fuzzy*. This clearly occurs because, similarly to what happens in quantum mechanics, we can't define a point with total resolution on the plane. We address this problem by introducing a Hamiltonian whose eigenstates, in a semiclassical limit, represent the curve we are looking for. In particular, we will focus on imposing Dirichlet boundary conditions for a complex scalar field in two spatial coordinates that satisfy $[\hat{x}^1, \hat{x}^2] = i\theta$ (plus eventually the time) and discuss specifically two types of curves, a straight one and a circle. Under certain approximations, we will calculate the propagators, Casimir energies and derive the rules for noncommutative Feynamn diagrams.