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Noncommutativity in space–time extended by Liouville field

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Abstract

The world-sheet quantum conformal invariance can be realized in the presence of the conformal factor F by inclusion of the Liouville term. In the background with linear dilaton field, $\Phi(x) = \Phi_0 + a_\mu x^\mu$, the field F becomes a new noncommutative variable. Therefore, it is natural to extend space–time with a new coordinate, F, in order to unify expressions for noncommutativity parameter Θ^{ij} of the Dp-brane space–time coordinates x^i, with the part Θ^i connecting noncommutativity between coordinates x^i and F. In this way we solve the problems of Dp-brane noncommutativity in a more elegant way. The technical advantage is in the fact that in the extended space–time the action with dilaton field can be rewritten in dilaton free form.

We use canonical method and extend its application to the derivation of boundary conditions. From requirement that Hamiltonian, as the time translation generator, has well-defined derivatives in the coordinates and momenta, we obtain boundary conditions directly in the canonical form.

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