

Construction of a Chern-Simons Model for Gravity

Trabalho #18

Apresentação Oral

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The Chern-Simons theories have shown quite encouraging results for gravitation, especially in the scenario established by the Loop Quantum Gravity, where we have many difficulties in solving the Hamiltonian constraint, associated to the invariance in relation to temporal diffeomorphisms. This is due to the emergence of so-called generic theories, where this constraint is no more an independent constraint, but a combination of the other constraints, which we know at first how to deal with. In this work we consider a Chern-Simons theory for a 5-dimensional expansion of the $(A)dS$ group, which introduces new fields in the theory, coming naturally as fields of matter that interact with the gravitational field. We construct the corresponding Chern-Simons action and we study its dynamics, using the Hamiltonian formalism of Dirac. By taking the fields of matter equal to zero, the action is reduced to Einstein-Hilbert's action with the cosmological constant term, plus a Gauss-Bonnet type term. We also show the existence of a new class of spatial diffeomorphisms (including the usual spatial diffeomorphisms), which allowed to show that the expanded model is indeed generic. Moreover we calculate the constraints associated with these new diffeomorphisms. We intend to study Schwarzschild-type solutions and possible cosmological models.

Comentários adicionais