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Covariant dynamics on the momentum space

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A geometrical interpretation of Schrödinger's kinetic and potential energy operators is proposed, allowing for a covariant momentum space formulation of the dynamics that is relevant for the theories with the generalization of the geometry of the momentum space. Some specific examples are discussed in the context of Euclidean Snyder (spherical momentum space) model. In this formulation the dynamics for different versions of the Snyder model turn out to be dynamically equivalent.
Furthermore, a scalar field theory is constructed on an energy-momentum background of constant curvature. The generalization of the usual Feynamn rules for the flat geometry follows from the requirement of their covariance. The main result is that the invariant amplitudes are finite at all orders of the perturbation theory, due to the finitness of the momentum space. Finally, the relation with a field theory in spacetime representation is briefly discussed.

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