Bicrossproduct structure of $κ$-Poincare group and non-commutative geometry

Shahn Majid, Henri Ruegg

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We show that the κ-deformed Poincar\'e quantum algebra proposed for elementary particle physics has the structure of a Hopf agebra bicrossproduct $U(so(1,3))\cobicross T$. The algebra is a semidirect product of the classical Lorentz group $so(1,3)$ acting in a deformed way on the momentum sector T. The novel feature is that the coalgebra is also semidirect, with a backreaction of the momentum sector on the Lorentz rotations. Using this, we show that the κ-Poincar\'e acts covariantly on a κ-Minkowski space, which we introduce. It turns out necessarily to be deformed and non-commutative. We also connect this algebra with a previous approach to Planck scale physics.

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kappa-Minkowski representations on Hilbert spaces

Alessandra Agostini

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The algebra of functions on kappa-Minkowski noncommutative spacetime is studied as algebra of operators on Hilbert spaces. The representations of this algebra are constructed and classified. This new approach leads to a natural construction of integration in kappa-Minkowski spacetime in terms of the usual trace of operators.

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