Contribution ID: **369** Type: **Poster**

The Curvature Aspects of Canonical Noncommutative versions of Flat Commutative Spaces

Monday 12 December 2022 14:00 (1 hour)

We consider the twisted-diffeomorphism framework of canonical noncommutative spaces in which the noncommutative version of metric tensor, Christoffel symbols, curvature tensors and curvature scalars are constructed in terms of their commutative counterparts. Further, we consider the two commutative spaces that are related to each other by a non-injective coordinate transformation i.e., a local-diffeomorphism transformation. We analyze the nature of curvatures of these two spaces after the introduction of canonical type noncommutativity of coordinates in these two spaces. Although the nature of curvature of these two spaces is same in the commutative case, it is fundamentally altered in the noncommutative case if at least one of the components of the metric tensor depends on more than one canonically noncommuting coordinates. One significant result is that a noncommutative Minkowski spacetime with such a metric structure is not flat. That is, the effect of noncommutativity in such cases naturally brings the gravitational effect into the theory. Another result which is geometrically significant is that a flat 2-dimensional commutative space with an appropriate metric structure can develop curvature after the introduction of canonical noncommutativity between its coordinates.

Session

Formal Theory

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Session Classification: Poster - 1