Generalized Enveloping Algebras and Quantum-Kinematic Coherent States of Noncompact Lie Groups

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Abstract

A new concept of “generalized enveloping algebra” is introduced by means of the generalized Heisenberg commutation relations of non-Abelian quantum kinematics. This concept is examined within the quantum-kinematic formalism of some noncompact Lie groups of a special kind. The well known Gel'fand theorem (which relates the center of the traditional enveloping algebra with the adjoint representation) is then extended to the generalized enveloping algebra of the group. In this way, the isomorphism of the “generalized left-center” and the “traditional right-center” of the corresponding enveloping algebras is proved within the left regular representation of noncompact Lie groups of the chosen kind. As an interesting application of generalized enveloping algebras, this paper contains a brief discussion of quantum-kinematic (boson) ladder operators for non-Abelian noncompact finite Lie groups and of their corresponding coherent states.