SOME PROPERTIES OF SYSTEMS WITH QUADRATIC HAMILTONIANS

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Let us consider the central extension of the covering group of the ten-parameter Galilei group. It is a Lie group. A representation of its Lie algebra by operators, which are at most quadratic in quantum positions and momenta, is given. According a result of Bóna [1], [2], this representation can be integrated into a unitary representation of the abovementioned central extension of the covering group of Galilei group. Orbits of this representations in the projective Hilbert space, constructed from an analytic vector, are manifolds, hence they have equal dimension in each point (see [1]). Using this fact, a result about eigenvectors of linear combinations of abovementioned (at most quadratic) generators is given. More precisely, a vector from the considered orbit is an eigenvector of such linear combination if and only if arbirary other vector from this orbit is. That means that for a given orbit either each vector is an eigenvector of such linear combination, or none of such vectors have this property. It depends only on the dimension of the considered orbit.

References

1. P. Bóna, *Classical Projections and Macroscopic Limits of Quantum Mechanical Systems*, unpublished monograph, Bratislava, 1984.
2. P. Bóna, *Extended Quantum Mechanics*, Acta Physica Slovaca **50** (2000), no. 1, 1-198.