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Abstract

Effects of excited state quantum phase
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correlators in systems with a U (n) dynamical
algebra
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Lie algebras are widely used to study systems in different fields of Physics. In particular, two levels bosonic models based on unitary algebras U (n) are used to describe the long-range interaction Ising model as well as molecular stretching vibrations -U (2)-, molecular bending motion -U (3)-, the rovibrational structure of diatomic molecules -U (4)-, and collective nuclear degrees of freedom -U (6)-.
In systems with a U (n) dynamical algebra, a model Hamiltonian can be defined with a single control parameter, which drives the system from U (n − 1) and to SO(n) dynamical symmetries. It is well known that in such systems a second order ground state quantum phase transition (QPT) occurs for a critical value of such control parameter. Moreover, an excited state QPT appears in the broken-symmetry phase.
In this work, we show that there is a fundamental difference between the U (2) case and models with U (n) with n ≥ 3. As an application, we compute the long time limit average of the out-of-time-order correlators in models with n = 2 and 3.

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