Subspace of Hamiltonian's eigenfunction described by the Generalized Heisenberg Algebra

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The development of algebras aimed at quantum systems emerged in an approach to one-dimensional integrable quantum models using Bethe's algebraic ansatz. The construction of different algebras was relevant to address a large class of physical phenomena. When the algebra is associated with the harmonic oscillator, it is called Heisenberg algebra and is presented in terms of the creation and annihilation operators. The generalized Heisenberg algebra (GHA) was forged in early 2000. It consists of a Heisenberg-type algebra that relies on an arbitrary function f that depends on the dimensionless Hamiltonian, and it is chosen to correspond to a quantum system. The purpose of this work is to develop a generalized Heisenberg algebra for quantum billiards. We depict a subspace of Hamiltonian's eigenfunction via GHA. We find the position representation of the ladder operators, coherent states, and the respective time evolution.