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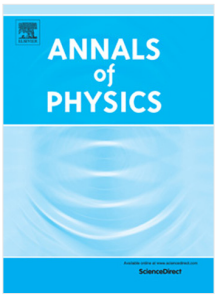

Supersymmetric symplectic quantum mechanics

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Supersymmetric Symplectic Quantum Mechanics

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Abstract

Symplectic Quantum Mechanics SQM considers a non-commutative algebra of functions on a phase space Γ and an associated Hilbert space $\mathcal{H}_\Gamma$ to construct a unitary representation for the Galilei group. From this unitary representation the Schrödinger equation is rewritten in phase space variables and the Wigner function can be derived without the use of the Liouville-von Neumann equation. In this article we extend the methods of supersymmetric quantum mechanics SUSYQM to SQM. With the purpose of applications in quantum systems, the factorization method of the quantum mechanical formalism is then set within supersymmetric SQM. A hierarchy of simpler hamiltonians is generated leading to new computation tools for solving the eigenvalue problem in SQM. We illustrate the results by computing the states and spectra of the problem of a charged particle in a homogeneous magnetic field as well as the corresponding Wigner function.

Keywords: Quantum Theory, Supersymmetry, Hamiltonian Hierarchy, Wigner Function.

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