

Classical and Thermodynamic Limits of Quantum Systems

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By employing generalized coherent states, such as $SU(N)$ and $SU(2)$ spin coherent states, the Hamiltonian of a quantum system can be mapped onto a continuous classical phase space. The Principle of Uniform Semiclassical Condensation (PUSC) states that the Wigner function, $(W_n(q,p))$, condenses uniformly onto a classical invariant component of phase space in the classical limit.

In many algebraic models, coherent states provide the optimal mean-field description of the quantum ground state; however, this is not a universal property. Using cumulative probability distributions, it is shown quantitatively that even when the mean-field ground state is a squeezed state rather than a coherent state, the coherent-state representation still yields the correct classical limit predicted by the PUSC.

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