

Engineering of Kerr-Hamiltonians in a cavity QED system

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We propose a protocol for the generation of effective universal nonlinear Kerr Hamiltonians in a collective-spin system coupled to bosonic modes of a cavity QED apparatus. We expand the effective collective spin Hamiltonian beyond the second-order term (the well-studied one-axis-twisting) and map it to an effective Kerr Hamiltonian using the Holstein-Primakoff transformation. We give examples of systems that can be simulated with this protocol.

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