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Title: Renormalization Analysis of Second Order Split-up for Spin-Boson Models

Abstract: We consider a quantum mechanical system, which is modeled by a Hamiltonian acting on a finite dimensional space with degenerate eigenvalues coupled to a field of relativistic bosons. Provided a mild infrared assumption and a split up assumption holds, we show existence of the ground state and ground state eigenvalue of the interacting system using operator theoretic renormalization. Moreover we prove that the ground state eigenvalue is an analytic function of the coupling constant in a cone with apex at the origin.