

Spectral analysis of a lattice spin-boson Hamiltonian with at most two photons

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A lattice model \mathcal{A}_2 of radiative decay (so-called spin-boson Hamiltonian) of a two level atom and at most two photons is considered. The results for the spin-boson Hamiltonian \mathcal{A}_2 with at most two photons are obtained by considering a more general model H . The location of the essential spectrum of H and \mathcal{A}_2 are described. The lower bound of the essential spectrum of H and \mathcal{A}_2 are estimated. Conditions which guarantee the finiteness of the number of eigenvalues of H , below the bottom of its essential spectrum are found. It is shown that the discrete spectrum of H might be infinite if the parameter functions are chosen in a special form.