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Rabi model and spin-boson model

The so-called quantum Rabi model and spin-boson model are discussed by path measures in this talk. The quantum Rabi model describes a linear interaction between a two-level atom and one-mode photon. The Hamiltonian of the Rabi model can be realized as a self-adjoint operator acting in a Hilbert space. The spectrum of the self-adjoint operator H can be studied by a path measure. H has purely discrete spectrum and each discrete spectrum can be regarded as a function of a coupling constant. Our problem is as follows. (i) Are there any crossings among them? (ii) If so, how do they take place? We can conjecture that the ground state energy of H has no crossing. In this talk, we prove this fact by a functional-integral method. As a corollary, we conclude that the ground state energy of H is simple (i.e., the ground state is unique). On the other hand, spin-boson model describes a linear interaction between a two-level atom and a scalar quantum field. Then spin-boson model seems to be an infinite freedom version of the Rabi model. We consider localization properties of the ground state of the spin-boson model by the functional-integral method.

Biography

Fumio Hiroshima has completed his PhD in the year 1996 from Hokkaido University. He is the Professor of Kyushu University and investigates quantum field theory from purely mathematical point of view and stochastic analysis. He has published more than 65 papers in reputed journals and books.

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