

Quantum Physics

Berry Phase and Fidelity in the Dicke model with A^2 term

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The instability, so-called the quantum-phase-like transition, in the Dicke model with a rotating-wave approximation for finite N atoms is investigated in terms of the Berry phase and the fidelity. It can be marked by the discontinuous behavior of these quantities as a function of the atom-field coupling parameter. Involving an additional field A^2 term, it is observed that the instability is not eliminated beyond the characteristic atom-field coupling parameter even for strong interaction of the bosonic fields, contrarily to the previous studies.

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