

Distinctive features of mixed states Pancharatnam phase

Mahmoud Abdel-Aty

Bahrain University, Mathematics Department, College of Science, Bahrain University,
Kingdom of Bahrain

abdelatyquantum@gmail.com

We analyze the problem of Pancharatnam phase of quantum systems. We extend the off-diagonal geometric phase to study distinctive features of quantum charge qubit initially starts from a mixed state and interacting with a leaky cavity. Under the exact resonance condition an exact solution to the master equation is obtained. Employing this solution an analytical expression for the temporal evolution of the Pancharatnam phase is given. Also, a general formula of the geometric phase of mixed states with non-degenerate eigenvalues under unitary evolution is given. Numerical investigations are carried out for different values of the mean photon number, coupling energies and different initial state settings. Finally, the relation between entanglement and Pancharatnam phase is discussed.