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Quantum Phase Transitions in Cavity Coupled Dot systems VIJAY KASISOMAYAJULA, ONOFRIO RUSSO, New Jersey Institute of Technology — We investigate a Quantum Dot System, in which the transconductance, in part, is due to spin coupling, with each dot subjected to a biasing voltage. When this system is housed in a QED cavity, the cavity dot coupling alters the spin coupling of the coupled dots significantly via the Purcell Effect. In this paper we show the extent to which one can control the various coupling parameters: the inter dot coupling, the individual dots coupling with the cavity and the coupled dots coupling with the cavity as a single entity. We show that the dots coupled to each other and to the cavity, the spin transport can be controlled selectively.[1] We derive the conditions for such control explicitly. Further, we discuss the Quantum phase transition effects due to the charge and spin transport through the dots.[2] The electron transport through the dots, electron-electron spin interaction and the electron-photon interaction are treated using the Non-equilibrium Green's Function Formalism.

[1]http://publish.aps.org/search/field/author/Trif_Mircea (Trif Mircea), http://publish.aps.org/search/field/author/Golovach_Vitaly_N (Vitaly N. Golovach), and http://publish.aps.org/search/field/author/Loss_Daniel (Daniel Loss), Phys. Rev. B 75, 085307 (2007)
[2]Michal Grochol, PRB 79, 205306 2009

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