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Coherence time enhancement of spin qubits in quantum dots RAMIN ABOLFATH, University of Texas, THOMAS BRABEC, University of Ottawa — We present the magnetic phase diagram of artificial H2 molecule in lateral quantum dots doped with magnetic impurities and investigate the possibilities in using their magnetic moments as qubit for the source of entanglement in quantum computer devices. An exact diagonalization method shows that the exchange coupling between magnetic impurities mediated by electrons changes sign following the electron singlet-triplet transition as a function of external magnetic field and plunger gate voltage [1]. We investigate the possibilities in increasing the qubit coherence time, using magnetic impurities. The localized d-electrons in magnetic impurities interact more weakly with host semiconductor nuclei and spin-orbit coupling in comparison with electrons confined in quantum dots. As a result, an increase in coherence time of up to an order of magnitude appears to be feasible. [1] Ramin M. Abolfath, PRB 80, 165332 (2009)

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