Abstract Submitted
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CNOT sequences for heterogeneous spin qubit architectures in a noisy environment ELENA FERRARO, MARCO FANCIULLI[1], MARCO DE MICHIELIS, IMM-CNR, Agrate Brianza Unit, Via Olivetti 2, 20864 Agrate Brianza (MB), Italy — Explicit CNOT gate sequences for two-qubits mixed architectures are presented in view of applications for large-scale quantum computation. Different kinds of coded spin qubits are combined allowing indeed the favorable physical properties of each to be employed. The building blocks for such composite systems are qubit architectures based on the electronic spin in electrostatically defined semiconductor quantum dots. They are the single quantum dot spin qubit, the double quantum dot singlet-triplet qubit and the double quantum dot hybrid qubit [1]. The effective Hamiltonian models expressed by only exchange interactions between pair of electrons are exploited in different geometrical configurations [2,3,4]. A numerical genetic algorithm that takes into account the realistic physical parameters involved is adopted. Gate operations are addressed by modulating the tunneling barriers and the energy offsets between different couple of quantum dots. Gate infidelities are calculated considering limitations due to unideal control of gate sequence pulses, hyperfine interaction and unwanted charge coupling. [1] Z. Shi et al, PRL 108,140503 (2012) [2] E. Ferraro et al, QIP 13,1155 (2014) [3] E. Ferraro - M. De Michielis et al, QIP 14,47 (2015) [4] M. De Michielis et al, JPA 48,065304 (2015)

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