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Three-spin qubits under the influence of tunneling noise[1] MAXIMILIAN RUSS, GUIDO BURKARD, Department of Physics, University of Konstanz, D-78457 Konstanz, Germany — We investigate the behavior of qubits consisting of three electron spins in double and triple quantum dots subject to external electric fields [2]. Our model includes two independent bias parameters, ε and ε_M, and two independent tunnel couplings, t_l and t_r, which all couple to external electromagnetic fields and can be controlled in experiments by gate voltages applied to the quantum dot structures. By varying the detuning parameters one can switch the qubit type by shifting the energies in the single quantum dots thus changing the electron occupancy in each dot resulting in different qubit encodings. We focus on random electromagnetic field fluctuations, i.e., "charge noise", at each gate resulting in dephasing of the qubit. We pay special attention to charge noise with respect to the tunnel couplings due to recent interest in symmetric gate operations where the tunnel barrier is controlled. We search for sweet spots and double sweet spots, working points which are least susceptible to noise and compare the results to detuning noise. As a result, we show the absence of non-trivial double sweet spots in the case for tunneling noise.

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[2]M. Russ, F. Ginzel, and G. Burkard, arXiv:1607.02351 (2016) (accepted for Phys. Rev. B)

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