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Non-Markovian errors and the cluster state machine gun TERRY RUDOLPH, Institute of Mathematical Sciences, Imperial College London, NETANEL LINDNER[1], Physics Department, Technion - Israel Institute of Technology — The hyperfine interaction between an electron and a nuclear spin bath is one of the more significant non-Markovian decoherence mechanisms affecting spin qubits in quantum dots. For the purposes of quantum error correction typically Markovian noise models are assumed. We show here that a recent proposal for a quantum dot based photon source Phys. Rev. Lett. 103, 113602 (2009) is not deleteriously affected by the non-Markovian noise because the noise can actually be, in some sense, bounded by a Markovian noise model. This allows for standard quantum fault tolerance results to go trough and shows that the device could be useful for scalable quantum computation. The technique we introduce for simplifying the analysis of the non Markovian noise will be of generic use in other architectures affected by similar decoherence mechanisms.

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