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Comparing different dynamical decoupling schemes in prolonging qubit[1] HU JIANLIANG, LIU RENBAO, Department of Physics, The Chinese University of Hong — In dynamical decoupling (DD), spins are flipped by a sequence of π-rotation pulses to average the coupling to the environment down to zero. Such schemes are important for protecting quantum coherence in quantum computing and in high-precision magnetic resonance spectroscopy. We carried out theoretical study of the performance of three DD schemes, namely, the Uhrig DD, the periodical DD and the concatenated DD, in prolonging the qubit coherence time in a quantum spin bath. We also studied how different DD schemes perform against certain errors in spin-flip controls such as the rotation-angle and timing errors. Using an exactly solvable model – the 1D XY model, we show that all the three DD schemes prolong the coherence time linearly with the number of spin-flip pulses, and the coherence reduction due to the control errors also increases linearly.

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