Abstract Submitted
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Model-independent dynamical decoupling to combat dephasing decoherence[1] WAYNE WITZEL[2], BENJAMIN LEE[3], SANKAR DAS SARMA, University of Maryland, College Park — We present a remarkable finding that a recently [1] discovered series of pulse sequences, designed to optimally restore coherence to a qubit in the spin-boson model of decoherence, is in fact completely model-independent and generically valid for arbitrary dephasing Hamiltonians given sufficiently short delay times between pulses [2]. The series is optimal in that fidelity is maximized for a given number of applied pulses. This is true for sufficiently short delay times because the series, with each pulse, cancels successive orders of a time expansion for the decay of qubit fidelity. Surprisingly, this property is independent of the model of the bath that induces dephasing-type decoherence. For this to be true, a linearly growing set of "unknowns" (the delay times) simultaneously satisfy an exponentially growing set of non-linear equations. This is an unexpected and miraculous property of nature and mathematics. [1] G. S. Uhrig, Phys. Rev. Lett. 98, 100504 (2007). [2] B. Lee, W. M. Witzel, S. Das Sarma, arXiv:0710.1416.

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