Abstract Submitted
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Exchange-Only Dynamical Decoupling in the 3-Qubit Decoherence Free Subsystem[1] BRYAN FONG, JACOB WEST, HRL Laboratories, LLC — The Uhrig dynamical decoupling sequence achieves high-order decoupling of a single system qubit from its dephasing bath through the use of bang-bang Pauli pulses at appropriately timed intervals [1]. This high-order decoupling property of the Uhrig sequence has been extended to decouple general noise from single [2] and multiple [3] qubit systems, using single-qubit Pauli pulses. For the 3-qubit decoherence free subsystem (DFS) and related subsystem encodings, Pauli pulses are not naturally available operations; instead, exchange interactions provide all required encoded operations [4]. Here we demonstrate that exchange interactions alone can achieve high-order decoupling against general noise in the 3-qubit DFS. We present decoupling sequences for a 3-qubit DFS coupled to classical and quantum baths and evaluate the performance of the sequences through numerical simulations. References: [1] G. S. Uhrig, Phys. Rev. Lett. 98, 100504 (2007). [2] J. R. West, B. H. Fong, and D. A. Lidar, Phys. Rev. Lett. 104, 130501 (2010). [3] Z.-Y. Wang and R.-B. Liu, Phys. Rev. A 83, 022306 (2011). [4] J. Kempe et al., Phys. Rev. A 63, 042307 (2001).

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