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Hamiltonian Tomography by Dynamical Decoupling[1] SHENG-TAO WANG, DONG-LING DENG, LU-MING DUAN, University of Michigan - Ann Arbor — The identification and verification of quantum dynamics is essential for quantum information and communication tasks and for benchmarking quantum simulation. Hamiltonian tomography for a general many-body system is difficult due to the massive entanglement generated in the many-body evolution. In this paper, we tackle this problem and show that techniques from dynamical decoupling can be exploited to reduce the formidable task to simple one- or two-spin tomography in a general many-qubit system. All parameters in the Hamiltonian can be retrieved and the required number of measurements scales at most quadratically with the system size. We further demonstrate numerically that the scheme is robust to various sources of errors typically present in experiments. We expect the scheme to be readily implementable in many experimental platforms.

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