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Correlation-induced suppression of decoherence in capacitively coupled Cooper-pair boxes[1] XUEDONG HU, University at Buffalo, SUNY, J. Q. YOU, Fudan University, China, FRANCO NORI, University of Michigan and Riken, Japan — Charge fluctuations from gate bias and background traps severely limit the performance of a charge qubit in a Cooper-pair box (CPB). Here we discuss an encoding approach[2] to control the decoherence effects of these charge fluctuations using two strongly capacitively coupled CPBs. This coupled-box system has a low-decoherence subspace of two states, for which we calculate the dephasing and relaxation rates using a master equation approach. Our results show that the inter-box Coulomb correlation can significantly suppress decoherence of this two-level system by reducing the strength of the system-environment interaction, making it a promising candidate as a logical qubit, encoded using two CPBs.

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[2]J.Q. You, X.Hu, and F. Nori, cond-mat/0407423.

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