Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Decoherence Suppression of a Solid State Qubit by Uncollapsing[1]

KYLE KEANE, Department of Physics and Astronomy, University of California, Riverside, CA 92521, USA, ALEXANDER N. KOROTKOV, Department of Electrical Engineering, University of California, Riverside, CA 92521, USA — We show that the qubit decoherence due to zero-temperature energy relaxation can be almost completely suppressed by using the quantum uncollapsing procedure. To protect a qubit state, a partial quantum measurement moves it towards the ground state, where it is kept during the storage period, while the second partial measurement restores the initial state. This procedure preferentially selects the cases without energy decay events. Stronger decoherence suppression requires smaller selection probability; a desired point in this trade-off can be chosen by varying the measurement strength. The experimental verification of the uncollapsing procedure has already been performed and using our model we can explain the reported fidelity of this process. The decoherence suppression experiment can be realized in a straightforward way using the superconducting phase qubit, with a minor modification to the experiment that has already been performed.

[1]This work was supported by NSA and IARPA under ARO grant W911NF-08-1-0336

Kyle Keane
University of California, Riverside, CA 92521, USA

Date submitted: 18 Nov 2009 Electronic form version 1.4