Abstract Submitted for the MAR11 Meeting of The American Physical Society

Energy relaxation mechanisms in capacitively shunted flux qubits ANTONIO CORCOLES, JIM ROZEN, MARY BETH ROTHWELL, GEORGE KEEFE, DAVID DI VINCENZO, MARK KETCHEN, JERRY CHOW, CHAD RIGETTI, JACK ROHRS, MARK BORSTELMANN, MATTHIAS STEFFEN, IBM, IBM QUANTUM COMPUTING GROUP TEAM — Energy losses in superconducting qubits remain a major object of study in the road towards scalable, highly coherent qubit devices. The current understanding of the loss mechanisms in these devices is far from being complete and it is sometimes difficult to experimentally separate the different contributions to decoherence. Here we compare a traditional three Josephson-junction flux qubit to the recently implemented capacitively shunted flux qubit [1], whose energy decay is thought to be limited by dielectric losses arising from native oxides in the shunting capacitor. Keeping all parameters identical except for the shunting capacitance, we obtain energy relaxation times that are comparable for both types of qubit. This suggests that the energy relaxation time is not limited by junction losses in capacitively shunted flux qubits. We discuss some other possible loss mechanisms present in these devices.

[1] M. Steffen *et al.* Phys. Rev. Lett. **105**, 100502 (2010)

Antonio Corcoles IBM

Date submitted: 15 Nov 2010

Electronic form version 1.4