Measuring the Chern Number of a Superconducting Qubit from Nonadiabatic Response M.D. SCHROER, W.F. KINDEL, JILA and University of Colorado at Boulder, M. KOLODRUBETZ, Boston University, M. SANDBERG, M.R. VISSERS, D.P. PAPPAS, NIST, A. POLKOVNIKOV, Boston University, K.W. LEHNERT, JILA and University of Colorado at Boulder — The accumulation of Berry's phase in superconducting qubits under cyclical evolution has been well studied,[1,2] typically requiring fully adiabatic evolution. We demonstrate an alternative means of accessing the topology of a qubit, based on nonadiabatic manipulation.[3] Integrating the measured Berry curvature over the Bloch sphere yields the Chern number (ch_I), which we find to be quantized. By adding an effective static field to the qubit, we demonstrate a topological transition from $ch_I = 1$ to $ch_I = 0$. This simple example of extracting the Chern number may be easily scaled to larger systems.

[1]P. J. Leek *et al.*, Science **318**, 5858 (2007)
[2]S. Berger *et al.* PRA **87**, 060303(R) (2013)
[3]V. Gritsev and A. Polkovnikov, PNAS **109**, 6457 (2012)

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