Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Quantized Rabi oscillation observed in the superconducting flux qubit LC-harmonic oscillator system K. SEMBA, J. JOHANSSON, S. SAITO, NTT Basic Research Labs, NTT Corp. and CREST Japan Science and Technology Agency, T. MENO, NTT Advanced Technology, H. NAKANO, NTT Basic Research Labs, NTT Corp. and CREST JSTA, M. UEDA, NTT Basic Research Labs, NTT Corp., CREST JSTA, Dept. of Physics, Tokyo Inst. of Tech., H. TAKAYANAGI, NTT Basic Research Labs, NTT Corp. and CREST JSTA — Superconducting circuit containing Josephson junctions is one of the promising candidates as a quantum bit (qubit) which is an essential building block for quantum computation. A flux qubit is represented by energetically lowest two collective states of macroscopic numbers of Cooper pairs which are linear combination of clockwise and counterclockwise persistent-current states. By replacing an atom with a flux qubit (artificial atom), and a high-Q cavity with an LC-circuit, quantum optics type experiments are possible on a superconductor chip. We have observed, for the first time, the vacuum Rabi oscillations in a superconducting flux qubit LC-oscillator coupled system [1]. We have also obtained evidence of level quantization of the LC circuit by observing the change in quantum oscillation frequency when the LC circuit was not initially in the vacuum state. Sharing a single superconducting LC-circuit with many flux qubits as a quantum information bus, spatially separated multiple qubits can be controlled by a set of microwave pulses. [1] J. Johansson et al., arXiv:cond-mat/0510457, http://www.brl.ntt.co.jp/group/shitsuryo-g/index.html

K. Semba
NTT Basic Research Labs

Date submitted: 19 Dec 2005 Electronic form version 1.4