Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Josephson parametric phase-locked oscillator: application to dispersive readout of superconducting qubits[1] ZHIRONG LIN, KUNIHIRO INOMATA, RIKEN Center for Emergent Matter Science, Japan, WILLIAM OLIVER, MIT Lincoln Laboratory, USA, KAZUKI KOSHINO, College of Liberal Arts and Sciences, Tokyo Medical and Dental University, Japan, YASUNOBU NAKAMURA, RIKEN and Research Center for Advanced Science and Technology, The University of Tokyo, Japan, JAW-SHEN TSAI, TSUYOSHI YAMAMOTO, RIKEN and NEC Smart Energy Research Laboratories, Japan — We present a new qubit readout scheme using a Josephson parametric phase-locked oscillator. The parametric oscillator is the same circuit as the flux-driven parametric amplifier used in Refs. 1 and 2, but is operated at the pump power above the oscillation threshold. The oscillator works as a sensitive binary phase detector and discriminates the dispersive phase shifts in the probe microwave field reflected from a resonator coupled to a qubit. The scheme offers fast and latching-type readout, but requires only a small number of photons in the resonator. Using this scheme, we achieved high-fidelity single-shot readout of a flux qubit with more than 90% contrast of Rabi oscillations. [1] T. Yamamoto *et al.*, APL **93**, 042510 (2008). [2] Z. R. Lin *et al.*, APL **103**, 132602 (2013).

[1]This work was supported by the FIRST Program, the MEXT Kakenhi, and the NICT Commissioned Research.

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Date submitted: 14 Nov 2013 Electronic form version 1.4