Abstract Submitted
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Ultrasensitive Electrometry with a Cavity-Embedded Cooper Pair Transistor[1] A. J. RIMBERG, JULIANG LI, Dartmouth College — In this experiment a cavity-embedded Cooper-pair transistor (cCPT) is used as a potentially quantum-limited electrometer. The cCPT consists of a Cooper pair transistor placed at the voltage antinode of a 5.7 GHz shorted quarter-wave resonator so that the CPT provides a galvanic connection between the cavity's central conductor and ground plane. The quantum inductance of the CPT, which appears in parallel with the effective inductance of the cavity resonance, can be modulated by application of either a gate voltage to the CPT island or a flux bias to the CPT/cavity loop. Changes in the CPT inductance shift the cavity resonant frequency, and therefore the phase of a microwave signal reflected from the cavity. The reflected wave is amplified by both SLUG[1] and HEMT amplifiers before its phase is measured. The cCPT can also be operated as a Josephson parametric amplifier (JPA). A pump tone at 11.4 GHz sent into the flux bias line has been shown to provide about 10dB gain. The possibility of parametrically amplifying the side bands produced by a charge detection measurement, thereby increasing the overall sensitivity of the cCPT, will also be investigated. 1. Hover, et al. Appl. Phys. Lett. **100**, 063503 (2012).

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