

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Radio-frequency measurement of an asymmetric single electron transistor** ZHONGQING JI, Rice University, Houston, TX 77005, WEIWEI XUE, A.J. RIMBERG, Dartmouth College, Hanover, NH 03755 — Since the invention of the radio-frequency single-electron transistor (RF-SET) by Schoelkopf et al., [1] most measurements have focused on the symmetric single electron transistor. It has been shown, however, that the symmetric SET has a rather low measurement efficiency in its normal working regime. [2][3] Recently, it has been pointed out that an asymmetric SET can be considerably more efficient than a symmetric SET as a quantum amplifier. In this case the measurement efficiency of the asymmetric SET becomes similar to that of the quantum point contact (QPC) detector which can approach the quantum limit. We investigate the asymmetric SET by fabricating Al/AlO<sub>x</sub> SETs with junction areas 40x40 nm<sup>2</sup> and 40x80nm<sup>2</sup> and total resistance of about 25kΩ. The results of RF and DC characterization of such asymmetric SETs will be discussed. [1] R. J. Schoelkopf, P. Wahlgren, A. A. Kozhevnikov, P. Delsing, D. E. Prober, *Science*, **280**, 1242 (1998). [2] A. N. Korotkov, *Phys. Rev. B*, **63**, 085312 (2001); **63**, 115403 (2001). [3] D. Mozyrsky, I. Martin, and M. B. Hastings, *Phys. Rev. Lett.*, **92**, 018303 (2004). [4] S. A. Gurvitz and G. P. Berman, *Phys. Rev. B*, **72**, 073303(2005).

Weiwei Xue  
Dartmouth College, Hanover, NH 03755

Date submitted: 02 Dec 2006

Electronic form version 1.4