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Radio-frequency single-electron transistor coupled to few-electron double quantum dot FENG PAN, JOEL STETTENHEIM, MUSTAFA BAL, WEIWEI XUE, Dartmouth College, ZHONGQING JI, Rice University, ALEXANDER RIMBERG, Dartmouth College, L.N. PFEIFFER, K.W. WEST, Bell Laboratories — The radio frequency single-electron transistor (rf-SET) has been shown to be an ultra fast and highly sensitive electrometer, and also has been used as a qubit readout device operated close to the quantum noise limit [1]. The interplay between the rf-SET electrometer and a two-level system offers an interesting system for study. Here we report our progress on investigating rf-SETs capacitively coupled to few-electron double quantum dots (DQDs). We fabricate lateral-defined DQDs from an AlGaAs/GaAs heterostructure and the rf-SET from superconducting aluminum embedded in a tank circuit. The sensitivity and bandwidth of on-chip rf-SET electrometer can be used to probe DQD operated in the few-electron regime. Alternatively, the DQD can be used as high-frequency quantum noise detector to probe SET operation in the subgap region [2,3]. Recent experimental results will be discussed. [1] M. H. Devoret and R. J. Schoelkopf, Nature, **406**, 1039 (2000). [2] R. Aguado and L. P. Kouwenhoven, Phys. Rev. Lett., **84**, 1986 (2000). [3] O. Naaman and J. Aumentado, Phys. Rev. Lett. **98**, 227001 (2007).

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