Radio-frequency single-electron transistor coupled to a few-electron double quantum dot\textsuperscript{1} FENG PAN, JOEL STTENTHEIM, MUSTAFA BAL, MINGYUN YUAN, ALEX RIMBERG, Dartmouth College, VLADIMIR UMANSKY, Weizmann Institute of Science — The radio frequency single-electron transistor (rf-SET) has been shown to be an ultra fast and highly sensitive electrometer, and can be potentially operated close to the quantum noise limit as a qubit readout device [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. We have observed coupling between SET and DQD and have optimized our device design to enhance coupling in the few-electron limit. Recent experimental results will be discussed. [1] M. H. Devoret and R. J. Schoelkopf, Nature, 406, 1039 (2000).

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