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Rabi oscillations at different tunnel couplings for an ac-gated quantum dot qubit BRANDUR THORGRIMSSON, DOHUN KIM, C.B. SIMMONS, DANIEL R. WARD, RYAN H. FOOTE, D.E. SAVAGE, M.G. LAGALLY, MARK FRIESEN, S.N. COPPERSMITH, M.A. ERIKSSON, Univ of Wisconsin, Madison — One way to create a qubit is to use two distinct positions of a single electron as qubit states. Such a system can be achieved by using the left and right positions in a gated double quantum dot. In this system the qubit is strongly coupled to electric fields and has potential for high-speed operations. By tuning specific gate voltages, the tunnel coupling between the left and right quantum dots can be changed. Here, by using resonant ac microwave driving and gate tuning, we explore variations of T2* and the Rabi frequency on the tunnel coupling and microwave drive power, and we study strong driving effects such as generation of second harmonics. This work was supported in part by ARO (W911NF-12-0607) and NSF (DMR-1206915 and PHY-1104660). Development and maintenance of the growth facilities used for fabricating samples is sup- ported by DOE (DE-FG02-03ER46028). This research utilized NSF-supported shared facilities at the University of Wisconsin-Madison.

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