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Effect of Two Level System Saturation on Charge Noise in Josephson Junction Qubits MAGDALENA CONSTANTIN, CLARE YU, University of California, Irvine, JOHN MARTINIS, University of California, Santa Barbara — It is not widely appreciated that two-level systems in small qubits can easily be strongly saturated when the applied electromagnetic flux J is much larger than the critical flux J_c. We show that charge noise S_Q in Josephson qubits can be produced by fluctuating two-level systems with electric dipole moments in the substrate using the standard flat density of states. At high frequencies the frequency and temperature behavior of the charge noise depends on the ratio J/J_c. Our results are consistent with experimental conclusions that $S_Q \sim 1/f$ at low frequencies and $S_Q \sim f$ at high frequencies.

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