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Relaxation in quantum dots due to evanescent-wave Johnson noise from a metallic backgate[1] LUKE LANGSJOEN, AMRIT POUDEL, MAXIM VAVILOV, ROBERT JOYNT, University of Wisconsin - Madison — This talk will present a study of decoherence in charge and spin qubits due to evanescent-wave Johnson noise (EWJN) in a laterally coupled double quantum dot and single quantum dot, respectively. The high density of evanescent modes in the vicinity of metallic gates causes energy relaxation and a loss of phase coherence of electrons trapped in quantum dots. These energy relaxation rates are derived, and EWJN is shown to be a dominant source of decoherence for spin qubits held at low magnetic fields. Previous studies in this field approximated the charge or spin qubit as a point dipole. Ignoring the finite size of the quantum dot in this way leads to a spurious divergence in the relaxation rate as the qubit approaches the metal. Our approach goes beyond the dipole approximation and remedies this unphysical divergence by taking into account the finite size of the quantum dot.

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