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Mesoscopic electrons driven by quantum microwave states I: squeezed states AASHISH CLERK, Department of Physics, McGill University, MATTHEW WOOLLEY, UNSW Canberra, JEAN-RENÉ SOUQUET, JULIEN GABELLI, PASCAL SIMON, Laboratoire de Physique des Solides, Université Paris Sud — Motivated by recent experiments where superconducting microwave circuits have been coupled to electrons in semiconductor nanostructures [1-3], we consider theoretically the general problem of a mesoscopic conductor (such as a quantum point contact) driven by quantum states of a microwave field in a cavity. We show that even in the simplest case of a coherent state, there are significant corrections to the dc current over the completely classical treatment used in standard photon-assisted tunnelling theory. The case of a squeezed microwave field leads to even more striking deviations. Our calculations incorporate both the use of quantum-optics phase-space methods, and also a general Keldysh formalism that allows a more complete description.

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