

Abstract Submitted
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Photon-assisted tunnelling with nonclassical microwaves in hybrid circuit QED systems JEAN-RENÉ SOUQUET, McGill Univ, MATTHEW WOOLLEY, University of New South Wales, JULIEN GABELLI, PASCAL SIMON, Universite Paris Sud, AASHISH CLERK, McGill Univ — Motivated by recent experiments where superconducting microwave circuits have been coupled to electrons in semiconductor nanostructures [1-3], we study theoretically the interplay of non-classical light produced in a cavity with electron transport through a tunnel junction [4]. We demonstrate that this basic light-matter interaction is naturally characterized by non-positive definite quasi-probability distributions which are intimately connected to the Glauber-Sudarshan P-function. We further demonstrate that this negative quasiprobability has unequivocal signatures on the differential conductance that should be easily detectable in state of art experiments. This thus turns the tunnel junction into a non-trivial probe of the microwave state. We also discuss the non-trivial backaction of the junction current on the cavity.

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