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Fluctuation-dissipation relations of a tunnel junction driven by a quantum circuit DANIEL ESTEVE, OLIVIER PARLAVECCHIO, CARLES ALTIMIRAS, Service de Physique de l'Etat Condensé (CNRS URA 2464), IRAMIS, CEA Saclay, 91191 Gif-sur-Yvette, France, JEAN-RENE SOUQUET, PASCAL SIMON, INES SAFI, Laboratoire de Physique des Solides, Université Paris-Sud, 91405 Orsay, France, PHILIPPE JOYEZ, DENIS VION, PATRICE ROCHE, FABIEN PORTIER, Service de Physique de l'Etat Condensé (CNRS URA 2464), IRAMIS, CEA Saclay, 91191 Gif-sur-Yvette, France, NANOELECTRONICS-QUANTRONICS GROUPS COLLABORATION, THEORY GROUP TEAM — We derive fluctuation-dissipation relations for a tunnel junction driven by a high impedance microwave resonator, displaying strong quantum fluctuations. We find that the fluctuation-dissipation relations derived for classical forces hold, provided the effect of the circuit's quantum fluctuations is incorporated into a modified non-linear I(V) curve. We also demonstrate that all quantities measured under a coherent time-dependent bias can be reconstructed from their dc counterpart with a photo-assisted tunneling relation. We confirm these predictions by implementing the circuit and measuring the dc current through the junction, its high frequency admittance and its current noise at the frequency of the resonator. Results avaiable in arXiv:1409.6696.

Fabien Portier
Service de Physique de l'Etat Condensé (CNRS URA 2464),
IRAMIS, CEA Saclay, 91191 Gif-sur-Yvette, France

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