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Quantum impurity model for microwave photons MOSHE GOLDSTEIN, Department of Physics, Yale University, 217 Prospect Street, New Haven, CT 06520, USA, MICHEL DEVORET, Departments of Physics and Applied Physics, Yale University, New Haven, CT 06520, USA, MANUEL HOUZET, SPSMS, UMR-E 9001, CEA-INAC/UJF-Grenoble 1, F-38054 Grenoble, France, LEONID GLAZMAN, Department of Physics, Yale University, 217 Prospect Street, New Haven, CT 06520, USA — We consider propagation of microwave photons along an array of superconducting grains with a set of weakly-coupled grains at its center. Quantum fluctuations of charge on the weakly- coupled grains make the process of "photon splitting" effective. In such a process, an incoming photon may be split into a number of photons of lower energy. The minimal number of photons created in such process depends on the symmetry properties of the corresponding quantum impurity model. As an example, we consider a specific circuit allowing quantum fluctuations between two charge configurations of two weakly- coupled grains, thus mimicking the behavior of an anisotropic Kondo impurity. Both ferromagnetic and antiferromagnetic Kondo regimes may be reached this way. We relate the rate of conversion of the incoming photons into the lower-energy ones to the dynamic spin susceptibility of the Kondo model.

Leonid Glazman
Department of Physics, Yale University, 217 Prospect Street,
New Haven, CT 06520, USA

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