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Microwave Photon Detector in Circuit QED JUAN JOSE GARCIA-RIPOLL, Instituto de Fisica Fundamental, CSIC, GUILLERMO ROMERO, Departamento de Fisica, Universidad de Santiago de Chile, ENRIQUE SOLANO, Departamento de Quimica-Fisica, Universidad del Pais Vasco, Bilbao — In this work we propose a design for a microwave photodetector based on elements from circuit QED such as the ones used in qubit designs. Our proposal consists on a microwave guide in which we embed circuital elements that can absorb photons and irreversibly change state. These incoherent absorption processes constitute the measurement itself. We first model this design using a general master equation for the propagating photons and the absorbing elements. We find that the detection efficiency for a single absorber is limited to 50%, and that this efficiency can be quickly increased by adding more elements with a moderate separation, obtaining 80% and 90% for two and three absorbers. Our abstract design has at least one possible implementation in which the absorbers are current biased Josephson junction. We demonstrate that the coupling between the guide and the junctions is strong enough, irrespectively of the microwave guide size, and derivate realistic parameters for high fidelity operation with current experiments. Patent pending No. 200802933, Oficina Espanola de Patentes y Marcas, 17/10/2008.

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