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Light-matter decoupling and A^2 term detection in superconducting circuits JUAN JOSE GARCIA-RIPOLL, Instituto de Física Fundamental, IFF-CSIC, Madrid, BORJA PEROPADRE, Department of Chemistry and Chemical Biology, Harvard University, SIMONE DE LIBERATO, School of Physics and Astronomy, University of Southampton — We study the spontaneous emission of a qubit interacting with a one-dimensional waveguide through a realistic minimal-coupling interaction. We show that the diamagnetic term A^2 leads to an effective decoupling of a single qubit from the electromagnetic field. This effect is observable at any range of qubit-photon couplings. For this we study a setup consisting of a transmon that is suspended over a transmission line. Assuming a standard model of qubit-line interaction, we prove that the relative strength of the A^2 term is controlled with the qubit-line separation and show that, as a consequence, the spontaneous emission rate of the suspended transmon onto the line can increase with such separation, instead of decreasing.[1]

[1]Light-matter decoupling and A^2 term detection in superconducting circuits, J. J. Garcia-Ripoll, B. Peropadre, S. De Liberato, arXiv:1410.7785

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