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**Probe susceptibility of a strongly driven qubit** MATTI SILVERI, University of Oulu, Finland, and Yale University, USA, JANI TUORILA, MIKA KEMPPAINEN, ERKKI THUNEBERG, University of Oulu, Finland — The characteristic of a quantum system change upon coupling it to a driving field. In a typical circuit QED setup, driving is implemented with microwaves and the driven superconducting qubit is probed via a coupled LC cavity whose transmission or reflection properties are measurable. However, the entanglement between the qubit and the driving field leads to the formation of quasienergy states and, thus, modifications of the probe response. Even if the non-driven qubit-cavity system lies in the dispersive regime, the response of the driven system may be better described by an absorptive approach[1]. We have shown by using the Floquet formalism and a calculation reminiscent of the Fermi's golden rule that the concept of the probe susceptibility can be extended to strongly driven quantum systems[2,3]. Furthermore, we have applied these results to interpret and explain accurately a measurement where a charge qubit is strongly driven via the Josephson nonlinearity and probed via an LC cavity[3]. [1] J. Tuorila et al., Phys. Rev. Lett. 105, 257003 (2010). [2] M. Silveri et al., Phys. Rev. B 87, 134505 (2013). [3] J. Tuorila et al., Supercond. Sci. Technol. 26, 124001 (2013).

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