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Dark states of cavity-coupled qubits S. FILIPP, A.F. VAN LOO, A. WALLRAFF, ETH QUANTUM DEVICE TEAM — In circuit quantum electrodynamics (QED) the cavity-mediated dispersive interaction is the dominant inter-qubit coupling mechanism when the qubits are detuned from the resonator. This mechanism can be used to realize two-qubit gates. Here, we investigate the strength of this interaction explicitly considering the Fabry-Perot like multi-mode structure of the microwave frequency transmission line resonator. We observe the formation of dark states when the qubits are driven jointly by the same resonator microwave field and tuned into resonance with each other [1]. These dark states arise from the symmetry properties of the coupled quantum system at the avoided level crossing. Furthermore, we study the suppression of spontaneous emission of the coupled-qubit system by driving it into its dark state using microwave fields local to the individual qubits.

[1] S. Filipp *et al.*, arXiv:1011.3732 (2010).

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