

Problem 4

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Consider a SC. cavity with two qubits coupled to it, both talking to the fundamental mode

a) Write down the effective Hamiltonian

b) Draw an effective circuit that describes the situation with 2 charge qubits

c) Compute the effective Hamiltonian in the limit in which both qubits are off-resonant $\delta_i = \Delta_i - \omega \neq 0$ from the cavity (\Rightarrow dispersive limit $|\delta_i| \gg |g_i|$)

d) Assuming that both qubits are identical, $\Delta_i = \Delta$, $g_i = g$, and at the symmetry point ($\delta_i = 0$), diagonalize the problem.

d1) What resonances do we excite when we drive the cavity as depicted above?

d2) What information do we obtain from the transmitted light at various frequencies around ω ?