cavity drive → undesired effect

① qubit transition resulting in readout fidelity   (10)

② increased dephasing   (4,7)

③ imperfect quantum state stabilization   (5,6,8)

④ qubit ac-stark shift, which can result in unwanted phase - accumulations   (12)

⑤ Measurement - induced dephasing   (13,14)

⑥ kerr nonlinearity   (15)

1. Hamiltonian settings

$$\hat{H} = \hat{H}_0 + \hat{H}_1 + \hat{H}_2$$

$$\hat{H}_0 = -\frac{\omega_q}{2}\sigma_z + \omega_r a^\dagger a + g(a^\dagger \sigma_- + a\sigma_+)$$

$$\hat{H}_1 = (a + a^\dagger)\,\varepsilon_c(t)\,\sin(\omega_c t + \phi_c)$$

$$\hat{H}_2 = \square\,\sigma_x + \cancel{\square}\,\sigma_y$$

let displacement operator $\hat{D}(q_c) = e^{q_c a^\dagger - q_c^* a}$, $\hat{\rho}_0(t) = \hat{D}^\dagger(q_c)\,\hat{\rho}(t)\,\hat{D}(q_c)$

$$\frac{d\rho}{dt} = -\frac{i}{\hbar}[H_c, \rho] + k\,D[\hat{a}]\hat{\rho} \cdots$$

$$\tilde{H} = D^\dagger H D - i\hbar D^\dagger \dot{D},$$