Transmon parameters and relations

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Parameter	Definition	Typical values	Values explanation	Realtion to other physical parameters
ω_q	Transition frequency from ground state to 1st excited state	$3-10GHz$	We are interested in making the excitation to the next level unprobable, so: $P_{0\to1}=\frac{e^{-\frac{hf}{k_BT}}}{1+e^{-\frac{hf}{k_BT}}}$ and we demand $\frac{hf}{k_BT}\sim10$ to finally get $f\sim10\frac{k_BT}{h}$. We can use standard RF equipement in the range $3-10GHz$ and also our refrigiration capabilites can get us to $\sim 14.4-48mK$	$\sqrt{8E_CE_J}$
α	Anharmonicity (difference between consecutive transition frequencies)	$100-300MHz$	Trade-off between: 1. Preventing unwanted transitions out of the computational subspace - the anharmonicity defines the minimal pulse duration in order to keep the bandwidth narrow enough to not exceed it. $\alpha_r=\alpha E_{01}$ $\alpha_r^{min}\sim(\tau_p\omega_{01})^{-1}\sim 18-600$ for $\tau_p=1-10ns, f_{01}=3-10GHz$ $C=\frac{e^2}{2hf}\approx 66-200fF$ 2. Smaller E_C value to enlarge $\frac{E_J}{E_C}$ to maintain nearly 0 offset charge dispersion $E_m(n_g)\simeq E_m(n_g=\frac{1}{4})-\frac{\epsilon_m}{2}\cos(2\pi n_g)$ and $\epsilon_m\simeq(-1)^m E_C\frac{2^{4m+5}}{m!}\sqrt{\frac{2}{\pi}}\left(\frac{E_j}{2E_C}\right)^{\frac{m}{2}+\frac{3}{4}}e^{-\sqrt{\frac{8E_J}{E_C}}}$ when these expressions only valid for $\frac{E_j}{E_C}\gg1$	$-E_C=-\frac{e^2}{2C}$
g	Coupling strength (to the resonator?)			
T_1				
T_2				

Table 1: Transmon parameters and relations