

## **Dissipation in Transmon**

Dissipation or decoherence is a large topic, concerning the loss of quantum state in the interaction with the environment. This presentation is based on section IV and V of Koch et al. (2008), which describes the dissipation in transmon system. And it mainly talks about the characterization of relaxation time  $T_1$  and dephasing time  $T_2$ , based on consideration of different noise channels. This presentation first introduces the general idea of decoherence and its main three channels, that is, depolarization channel, dephasing channel and amplitude damping channel. With this knowledge we will go through various types of dissipation discussed in the paper, which are categorized into relaxation and dephasing contributions. After the analysis of different noise sources and their contribution to dissipation time, we compare transmon and Cooper Pair Box and could see there is a good improvement in the robustness of the system, which is attributed to exponentially small energy dispersion in transmon system.