

Circuit QED Experiment

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Abstract:

Mainly based on the paper “*Strong coupling of a single photon to a superconducting qubit using circuit quantum electrodynamics*” (Nature 431.7005(2004), A. Wallraff et al.), the experiment illustrating the strong coupling of microwave photon and superconducting artificial atom will be discussed in this talk. After a brief summary of the principle of Cooper pair box (CPB), cavity QED and the coupling between them, the experimental methods and the solved difficulties including sample fabrication, low temperature environment and microwave spectroscopic probing measurement techniques for the system will be demonstrated. Finally, the results of the vacuum Rabi splitting and anti-crossing phenomenon which are the evidence of coupling will be presented. The debate on the superiority of superconducting QED comparing with Rydberg atoms and the validity of the results (e.g. the influence of thermal photon and number of probing photon) will also be provided.

In this talk, Peng Zhou will majorly discuss the motivation and the results of the experiment, while Zi-Jin Lei will focus on the experiment requirements and methods.