Quantum Collective States in Superconducting 5-Qubit Network

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Abstract We'll present experimental evidence of Quantum Collective States in Superconducting 5-Qubit Network

T-type two resonators Superconducting Qubit Network (SQN) with 5 flux qubits were designed, fabricated, and measured at ultra-low temperatures (15 mK) in terms of measurements of transmission coefficient S_{12} vs frequency f (one tone spectrum) and in the presence of external magnetic field. In our case there were observed some resonant dips in S_{12} vs f due to energy transitions between ground state and first excited state of qubits as well a main resonant dip due to energy transitions between ground and first excited of collective quantum state. Furthermore a clear modulation of the resonant dips as a function of the external magnetic field demonstrates the contribution both of single and of collective qubits in the dynamics of the network. Experimental results are in a good agreement with theory of the collective quantum dynamics occurring in various interacting superconducting qubit in SQN in the presence of a spread of individual qubit frequencies. New topological configuration of SQN will be proposed for quantum integration.