Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Galvanic coupling of two superconducting microwave resonators[1]

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Thermal entanglement forms when lowering the temperature sufficiently and can be detected via suitable correlation measurements on, e.g., a system of two degenerate coupled microwave resonators. In an actual experiment, this requires a coupling strength of 10-20% of the transition frequency. For superconducting flux quantum circuits, such large couplings are usually obtained using the kinetic inductance: the circuits have to be galvanically connected and form a single entity. Nevertheless, the physics can often be described by two separate systems with an enhanced coupling constant. In contrast, we show that the mode structure of two coupled superconducting microwave resonators changes discontinuously when connecting them galvanically instead of placing them very close to each other and explain this phenomenon with a toy model.

[1]We acknowledge support form SFB631, NIM, and PV/EHU Grant GIU07/40, and European project EuroSQIP.

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Date submitted: 03 Dec 2009 Electronic form version 1.4