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**Many-body effects of quantum impurity models via circuit QED**

PRASENJIT DUTT, MICHEL DEVORET, KARYN LE HUR, Yale University, New Haven, CT. — Circuit QED systems serve as an ideal quantum simulator of condensed matter models, given the great degree of experimental precision and control with which they can be manipulated. Quantum impurity models exhibiting renormalization and confinement ideas reminiscent of QCD, can be realized in circuits comprising superconducting qubits and long transmission lines, which play the role of macroscopic bosonic baths. In particular, it is possible to use such systems to engineer standard low energy many-body Hamiltonians such as the spin-boson or anisotropic Kondo model. We develop a framework combining input-output theory and many-body techniques to study correlated photon transport and specifically the qubit response in such circuits.

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