SEMPARIS – Séminaires en région parisienne

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Forum de Physique Statistique @ ENS

Mercredi 20 Avril 2022, 12 :00
LPENS, L361
Domaines : cond-mat.stat-mech

Titre : *Quantum field theory on a superconducting chip*

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Résumé : *Superconducting circuits are seen as a promising platform for engineering complex quantum states, either with the purpose of implementing large scale quantum algorithms, or to emulate quantum many-body problems of interest for physicists.*

We investigate both experimentally and theoretically the possibility to realize quantum impurity models that provide not only bosonic analogs to the electronic Kondo effect, but also strong coupling regimes of quantum electrodynamics, equivalent to boosting the fine structure constant close to unity.

As a result, we evidence several interaction-driven effects that represent two sides of the same coin : i) a giant renormalization of the frequency of an artificial atom (the impurity) by vacuum fluctuations of the quantum field; ii) a broadband inelastic scattering of the external photons by the internal dynamics of the atom.

We discuss also critically the advantages and limitations of superconducting circuits for the exploration of many-body phenomena.
