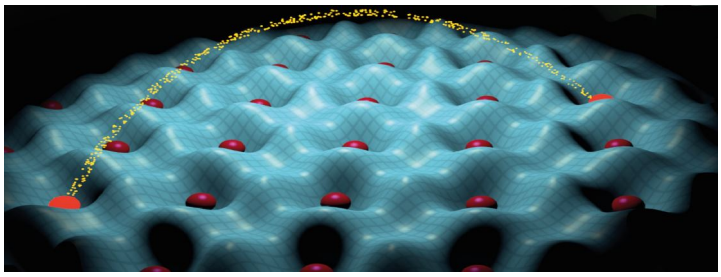

Contribution ID: **13** Type: **not specified**

”Recent advances and perspectives in multi-mode circuit QED”

Tuesday 18 June 2024 11:40 (1 hour)

In this talk, we will begin with a general introduction on multi-mode cavity quantum electrodynamics (QED). Following this, we will delve into three pioneering frontiers. First, we will explore the phenomenon of strong photon-photon interactions and many-body localization in multi-mode circuit QED systems consisting of a single superconducting qubit coupled to a transmission line resonator [1,2]. Next, we will examine the emergence of unconventional phase transitions in high-impedance circuit QED systems [3]. Finally, we will explore the emergence of direct and dual Shapiro steps using multi-mode circuit QED and their robustness, crucial to close the quantum metrological triangle [4]. We will discuss general perspectives in this emerging field.

1. N. Mehta, R. Kuzmin, C. Ciuti, V. E. Manucharyan, Nature 613, 650-655 (2023). “Down-conversion of a single photon as a probe of many-body localization.”
2. N. Mehta, C. Ciuti, R. Kuzmin, V. E. Manucharyan, arXiv:2210.14681. “Theory of strong down-conversion in multi-mode cavity and circuit QED.”
3. L. Giacomelli, C. Ciuti, arXiv:2307.06383, Nature Comm. in press. “Emergent quantum phase transition of a Josephson junction coupled to a high-impedance multi-mode resonator.”
4. F. Borletto, L. Giacomelli, C. Ciuti, arXiv:2405.12935. “Circuit QED theory of direct and dual Shapiro steps with finite-size transmission line resonators.”

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