THE UNIVERSITY OF HONG KONG

DEPARTMENT OF PHYSICS
SEMINAR

Many-body physics of cavity-embedded quantum matter

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Abstract:

Controlling the properties of quantum matter is a central goal of modern condensed matter physics. In recent years, cavity embedding—that is, placing matter in a cavity—has emerged as a new potential tuning knob. A key feature of such systems is the coexistence of degrees of freedom with distinct levels of locality, on one hand, atoms or electrons with local interactions while on the other cavity modes which are typically delocalized across the entire matter system. In this talk I will focus on this unconventional framework and its effect on different aspects of quantum many body physics, such as dynamical properties and topological order. In particular I will discuss two example systems, Fractional Quantum Hall liquids in THz cavities [1] and a Rydberg atom array coupled to an optical cavity [2], where questions regarding the interplay between local and non-local dynamics are both theoretically and experimentally relevant.

Reference:

[1] Zeno Bacciconi, H. Xavier, T. Chanda, I. Carusotto, M. Dalmonte; PRX 15,021027 (2025)
[2] Zeno Bacciconi, H. Xavier, M. Marinelli, D. Bhakuni, M. Dalmonte; PRL 134,213604 (2025)

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Anyone interested is welcome to attend.