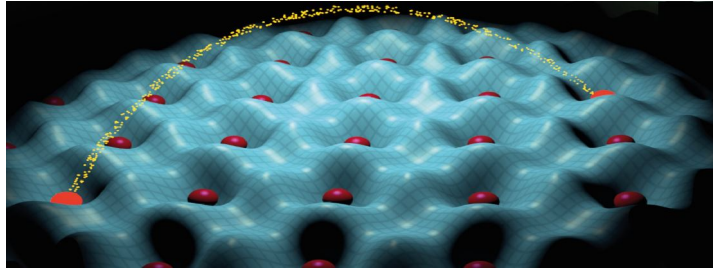


Challenges and perspectives in resonator-mediated quantum many-body physics: From atoms to solid state



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”Microscopy of and for fermions with cavity-mediated interactions”

Monday 17 June 2024 14:30 (30 minutes)

The ability to address atoms or emitters locally is among the most important capabilities of quantum gases experiments. Cavity QED methods for detection and manipulation, by singling out one or a set of modes determined by the geometry, usually sacrifice spatial resolution in favor of enhanced sensitivity or strong non-linearities. I will describe two experiments in which we demonstrate local measurements and addressing of atoms in a high-finesse cavity. In the first one, I will show the direct, in-situ observation of the self-organization transition in a unitary Fermi gas under side-pumping. In the second, I will describe a new device combining a high-finesse cavity and a microscope in a single optical element, that allows for the local control over light-matter interaction. I will then discuss some of the perspectives that these systems open for analogue quantum simulation.

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