10 de JULIO de 2024

12.00 h
Sala de Grados, Edificio A
Fac. Ciencias, Campus San Francisco

INMA Junior

REMOTE SPIN-SPIN INTERACTIONS MEDIATED BY SUPERCONDUCTING CIRCUITS FOR QUANTUM APPLICATIONS

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In the past decades, a grand part of the physics community has been particularly excited about the idea of quantum information processing. This idea merges two of the greatest advances in science and technology that took place during the twentieth century: the development of quantum mechanics and the technological revolution that involved the invention of the transistor and integrated circuits.

Building the hardware for the future quantum computer remains one of the nowadays greatest challenges among the quantum science community. In this talk, I will present our proposal of a hybrid platform for quantum computing that combines molecular spins and superconducting circuits. This platform allows scaling up quantum computational resources by either exploiting the chemical design of molecules behaving as multiple qubits or qudits or via a proper engineering of the superconducting circuit. Here, we address experimentally this second option and realize resonator pairs able to introduce communication channels between remote spin qubit ensembles.

The first part of the talk will consist of a general introduction to the main concepts and techniques used to perform the experiments. The second part of the talk will focus on recent experimental results performed in our laboratories, that bear evidence for the coherent coupling between the polaritonic light-matter states of both resonators. These experiments pave the way for introducing coherent communication channels between two remote spin qubit ensembles, thus for scaling up this hybrid platform.

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