Contribution ID: **126** Type: **Invited**

Quantum simulation with quantum computers, an introduction

Thursday, June 1, 2023 2:20 PM (50 minutes)

In this talk I will provide a tutorial introduction to quantum simulation with quantum computers. I will review the failure of conventional computing to address many-body problems and how this prevents progress in many scientific areas. I will discuss whether and how quantum computers, either fault tolerant in the future or noisy intermediate scale state of the art, can help to solve many-body problems. I will present the main challenges for quantum simulation algorithms: quantum state preparation, dynamical evolution and post-processing, including some recent work of my group [1,2,3]

[1] Preparing valence-bond-solid states on noisy intermediate-scale quantum computers
Bruno Murta, Pedro M. Q. Cruz, and J. Fernández-Rossier,
Phys. Rev. Research 5, 013190 (2023)

[2] Gutzwiller wave function on a digital quantum computer
Bruno Murta and J. Fernández-Rossier
Phys. Rev. B 103, L241113 (2021)

[3] Optimizing quantum phase estimation for the simulation of Hamiltonian eigenstates
P. M. Queiroz da Cruz, G. Catarina, R. Gautier and J. Fernández-Rossier
Quantum Science and Technology 5, 044005 (2020)

Presenter: FERNÁNDEZ-ROSSIER, Joaquín

Session Classification: Session 4.3