ICFO



INSIGHT SEMINAR: Surface Charge Density Wave in UTe2 and new developments in atomic scale studies of quantum materials

HERMANN JESUS SUDEROW RODRIGUEZ

May 22, 2025
12:00 to 13:00
Elements Room

ABSTRACT:

The spatially uniform electronic density characteristic of a metal can become unstable at low temperatures, leading to the formation of charge density waves (CDWs). These CDWs, observed in dichalcogenides, cuprates, and pnictides arise from features in the electron and lattice bandstructures that facilitate charge ordering. CDWs are often considered to compete with Kondo screening and are relatively rare in heavy fermion metals. However, the heavy fermion topological superconductor candidate UTe2 presents a notable exception, exhibiting a CDW whose origin remains elusive. Here I will report on new measurements clarifying

relevant aspects of the CDW in UTe2 [1]. I will also review atomic scale studies at surfaces of quantum materials, including the observation of quantized states of heavy fermion quasiparticles [2], and present recent developments in Josephson Scanning Tunneling Microscopy [3].?

[1] Surface charge density wave in UTe2, P. Garcia Talavera et al, Arxiv 2504.12505

[2] Quantum well states at the surface of a heavy fermion superconductor, E. Herrera et al Nature 616, 465 (2023)

[3] The feedback driven atomic scale Josephson microscope, S.D. Escribano et al, Nat Co (2025)

BIO:

Condensed Matter Physics professor at the Universidad Autonoma de Madrid. Former Director of the Nicolas Cabrera Institute and former chair of the physics panel of AEI, APS fellow, APS outstanding referee, former IUPAP C5 commission member, DPG and RSEF member. Chair of former COST Action nanocohybri.eu and of present COST Action superqumap.eu. Expert in atomic scale measurements in dilution refrigerators, quantum materials and low temperature physics.

Hosted by: Prof. Dr. Jens Biegert