Monika Aidelsburger

Conferenciante	Monika Aidelsburger
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Título de la charla	Quantum simulation - Engineering & understanding quantum systems atom-by-atom

Resumen

Quantum simulation provides new insights into the complex properties of quantum many-body systems in regimes that are not accessible with state-of-the-art classical numerical methods.

In this talk, I will introduce quantum simulators based on ultracold atoms in optical lattices, where control at the level of individual particles can now be achieved in systems of several thousand atoms. I will discuss how these platforms enable the exploration of topological phases of matter and their interplay with interactions and disorder.

Building on these capabilities, we have recently realized non-equilibrium U(1) quantum spin liquids of Rokhsar-Kivelson type, establishing a direct connection to lattice gauge theories.

Finally, I will highlight recent experimental advances that provide new ways to prepare and probe complex quantum states, opening routes to strongly correlated and out-of-equilibrium many-body physics, where neutral-atom platforms not only emulate but are increasingly enabling the discovery of new quantum phenomena.