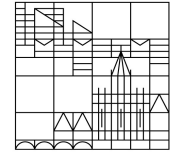


Theoretical Physics

Colloquium

Universität
Konstanz



Mo 25.11.24
13:30 Uhr
P 603



Dr. Christina Psaroudaki
Ecole Normale Supérieure (LPENS) , Paris

Quantum Functionalities of Magnetic Skyrmions

In this talk, I will discuss the development of magnetic nano-skyrmions as promising candidates for quantum logic elements, focusing on their potential applications in quantum computing. Nano-skyrmions possess quantized helicity excitations, and quantum tunneling between skyrmions with distinct helicities highlights their quantum nature. By harnessing these unique properties, we propose skyrmion qubits where information is stored in the quantum degree of helicity. Electric and magnetic fields can adjust the logical states of these qubits, offering a versatile operation regime with high anharmonicity.

I will explore the role of electrical control over helicity, opening new pathways for functionalizing collective spin states. Additionally, I will discuss the microwave pulses necessary to generate single-qubit gates and multiqubit schemes that promise scalable architectures with tailored couplings. Scalability, controllability by microwave fields, and nonvolatile readout techniques converge to make skyrmion qubits highly attractive for quantum processors. This talk will highlight the exciting developments, challenges, and potential breakthroughs in quantum magnetism and quantum information using skyrmions.

Host:
Sebastián Díaz (AG Belzig)
Organization:
Javier del Pino