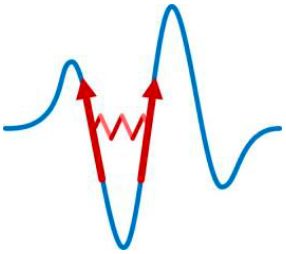
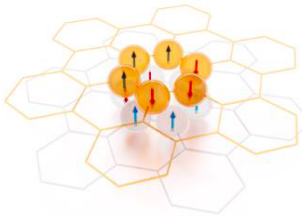
INSTITUT DE PHYSIQUE ET CHIMIE DES MATERIAUX DE STRASBOURG
23, rue du Loess, 67034 STRASBOURG Cedex 2

Séminaire AXE 4 | AXE 1
Magnétisme | Sciences et Matériaux Quantiques





Mardi 5 mai 2026 | 11:00 | Auditorium de l'IPCMS

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Quantum Dynamics of Skyrmions Beyond Chiral Magnets

Chirality is a fundamental concept in physics, appearing in everything from particle properties to emergent quasiparticles such as skyrmions, topologically protected spin textures with twisted configurations defined by helicity. While helicity is typically fixed in chiral magnets, frustrated magnets offer a new platform where helicity becomes a free parameter, enabling richer excitation spectra and complex magnetization dynamics. In this talk, I present magnetic nano-skyrmions as candidates for quantum logic elements, focusing on their potential in quantum computing [1, 2]. I then turn to collective spin-wave excitations, where hybridization between internal skyrmion modes and magnons gives rise to dynamical magnon superlattices, interference patterns of localized spin waves [3]. In skyrmion lattices, these localized modes form complex magnonic bands with nontrivial Chern numbers, further enriched by long-range interactions. These findings reveal a rich interplay between frustration, topology, and dynamics, and open new directions for skyrmion-based magnonic devices beyond the conventional chiral paradigm.

[1] A. P. Petrović, C. Psaroudaki, et al., Rev. Mod. Phys. 97, 031001 (2025)
[2] C. Psaroudaki and C. Panagopoulos, Phys. Rev. Lett. 127, 067201 (2021)
[3] A. Hullahalli, C. Panagopoulos, and C. Psaroudaki, arXiv:2601.00363 (2026)

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