



Πανεπιστήμιο Κύπρου
Τμήμα Φυσικής

Το Τμήμα Φυσικής του Πανεπιστημίου Κύπρου
σας προσκαλεί την

Τετάρτη, 2 Οκτωβρίου 2024, ώρα 16:00
στην αίθουσα B228, στο κτίριο 13 στην Πανεπιστημιούπολη

στην παρουσίαση της Διδακτορικής Διατριβής της Αγγελικής Αγόρου

“New pathways towards reconfigurable skyrmionic logic gates”

Magnetic Skyrmions are nanoscale, topologically protected spin structures that have attracted significant attention for their stability, small size, and low-energy manipulation. These properties make Skyrmions ideal candidates for next-generation spintronic devices. Since their discovery in 2009, Skyrmions have shown promise in applications like racetrack memories, logic gates, and neuromorphic computing. However, to move from theoretical potential to practical technology, challenges such as controlling Skyrmion dynamics and addressing the Skyrmion Hall Effect (SkHE) must be tackled.

In this talk, I will explore how skyrmions can be harnessed for logic applications. We will explore Skyrmion collisions in nanotracks, where an exciting observation is Skyrmion fusion. This topological transition offers a new approach to low-power, reconfigurable logic gates. A key challenge is ensuring that Skyrmions can move at high speeds along straight trajectories, which is crucial for reliable logic operations. I will discuss the use of synthetic antiferromagnets (SAFs), to suppress the SkHE and allow stable Skyrmion motion. In addition, I will present our findings on the excitations of weakly-coupled Antiskyrmions in similar systems.

Finally, I will present a conceptual design for Skyrmion-based logic gates. Using a simple cross-bar geometry, we demonstrate that the same device can perform different logic operations, such as OR and XOR, depending on current density. Additionally, by introducing a third Skyrmion coupled through a SAF, we can reconfigure the gate's functionality and significantly reduce the current required for Skyrmion fusion. Such novel skyrmion logic gates open new pathways for voltage-controlled, energy-efficient logic in future computing technologies.

Η παρουσίαση θα είναι ανοικτή στο κοινό

Για περισσότερες πληροφορίες παρακαλώ επικοινωνείτε: Τμήμα Φυσικής, τηλέφωνο: 22892820