

Seminar: Hard Condensed Matter Theory

Room: Galileo room, 01-128 (Staudinger Weg 9)

Time: Tuesday, 04.04.2017, 14:00

Daniele Pinna

Unité Mixte de Physique CNRS, Thales, Univ. Paris-Sud

Skyrmion Gas Manipulation for Probabilistic Computing

The topologically protected magnetic spin configurations known as skyrmions offer promising applications due to their stability, mobility and localization. In this work, we emphasize how to leverage the thermally driven dynamics of an ensemble of such particles to perform computing tasks.

We propose a device employing a skyrmion gas to reshuffle a random signal into an uncorrelated copy of itself. This is demonstrated by modelling the ensemble dynamics in a collective coordinate approach where skyrmion-skyrmion and skyrmion-boundary interactions are accounted for phenomenologically. Our numerical results are used to develop a proof-of-concept for an energy efficient device with a low area imprint. Whereas its immediate application to stochastic computing circuit designs will be made apparent, we argue that its basic functionality, reminiscent of an integrate-and-fire neuron, qualifies it as a novel bio-inspired building block.

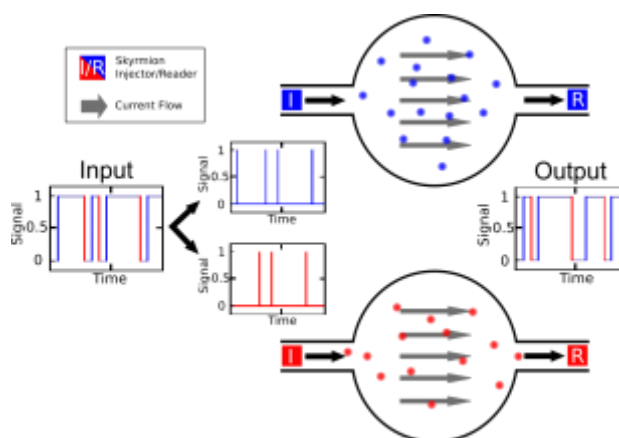


Diagram of the skyrmionic signal reshuffler.

All interested are cordially welcome!

K. Everschor-Sitte, Email: kaeversc@uni-mainz.de