Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Stability of single skyrmionic bits.[1] OLENA VEDMEDENKO, JULIAN HAGEMEISTER, NIKLAS ROMMING, KIRSTEN VON BERGMANN, ROLAND WIESENDANGER, University of Hamburg — The switching between topologically distinct skyrmionic and ferromagnetic states has been proposed as a bit operation for information storage. While long lifetimes of the bits are required for data storage devices, the lifetimes of skyrmions have not been addressed so far. Here we show by means of atomistic Monte Carlo simulations that the field-dependent mean lifetimes of the skyrmionic and ferromagnetic states have a high asymmetry with respect to the critical magnetic field, at which these lifetimes are identical. According to our calculations, the main reason for the enhanced stability of skyrmions is a different field dependence of skyrmionic and ferromagnetic activation energies and a lower attempt frequency of skyrmions rather than the height of energy barriers. We use this knowledge to propose a procedure for the determination of effective material parameters and the quantification of the Monte Carlo timescale from the comparison of theoretical and experimental data [1]. [1] Nature Comms. 6, 8455 (2015)

[1]Financial support from the DFG in the framework of the SFB668 is acknowledged

Olena Vedmedenko
University of Hamburg

Date submitted: 05 Nov 2015 Electronic form version 1.4