Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Physical Mechanisms and Limits of Skyrmions for Information Processing and Storage[1] GEN YIN, ROGER LAKE, Department of Electrical Engineering, UC Riverside, CHIA-LING CHIEN, JIADONG ZANG, Department of Physics and Astronomy, Johns Hopkins University — Magnetic Skyrmions have been proposed for applications in future information storage because of their small size, their stability and their facial movement with low current. For such purposes the ability to create single Skyrmions is required and an understanding of the process of Skyrmion creation and decay is highly desirable. Here we numerically show that the location and the moment of Skyrmion creation or annihilation can be precisely controlled by a nano second unpolarized current pulse. To analyze the microscopic process we employ a lattice version of the topological charge on a tight-binding 2D plate. It provides a clear picture of the spin trajectories and orientations that locally trigger a topological transition, and it reviews the topological origin of a Skyrmion's stability at finite temperatures. The robustness and experimental feasibility of the proposed mechanism are numerically examined.

[1]This material is based upon work supported by the National Science Foundation under Grant No. NSF-1408168

Gen Yin
Department of Electrical Engineering, UC Riverside

Date submitted: 14 Nov 2014 Electronic form version 1.4