Abstract Submitted
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Nucleation and Control of Magnetic Quasi-particles via Extrinsic and Intrinsic Energies[1] JAVIER PULECIO, Dept. CMPMS, Brookhaven National Laboratory, PETER WARNICKE, SLS, Paul Scherrer Institute, DARIO ARENA, NSLS, Brookhaven National Laboratory, MI-YOUNG IM, CXRO, LBNL and Dept. Emerging Mater. Science, DGIST, SHAWN POLLARD, Dept. of Phys. and Astro., Stony Brook University, PETER FISCHER, CXRO, LBNL and Dept. Phys., UC Santa Cruz, YIMEI ZHU, Dept. CMPMS, Brookhaven National Laboratory — Magnetic quasi-particles present an excellent opportunity to study fundamental magnetic properties and dynamics. The fine balance of energies including demagnetization, direct exchange, external perturbations, crystalline anisotropy, indirect exchange, and DMI, allows for the nucleation of a diverse ensemble of spin textures such as vortices, merons, and skyrmions, all of which demonstrate unique behavior. We present our investigations of single vortex symmetry breaking under external perturbations and demonstrate a method to determine the core polarity using Lorentz Transmission Electron Microscopy [1]. We also discuss how to tailor the high-frequency dynamics of coupled coaxial vortices using indirect exchange interactions [2]. We conclude by discussing the nucleation of unconventional chiral spin textures in nano-disc heterostructures using a complementary multi-technique approach, i.e. micromagnetic modeling, FMR, MFM, MTXM, and LTEM.

[1] J.F. Pulecio, S.D. Pollard, P. Warnicke, D.A. Arena, Y. Zhu, Appl. Phys. Lett. 105 (2014) 132403. doi:10.1063/1.4893422.
[2] J.F. Pulecio, P. Warnicke, S.D. Pollard, D.A. Arena, Y. Zhu, Nat. Commun. 5 (2014) 3760. doi:10.1038/ncomms4760.

[1]DOE BES #DE-AC02-98CH10886, DOE BES #DE-AC02-05-CH11231, NRF Korea MEST #2012K1A4A3053565.

Javier Pulecio
Dept. CMPMS, Brookhaven National Laboratory

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