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### **Research Interests:**

- Application of nanotechnology to create novel permanent magnets (spring magnets)
- Laterally confined nanomagnets
- Development of magnetic electronics
- Bio-inspired self-assembly of magnetic nanostructures
- Magnetic surfaces, films, wedges and superlattices, including hybrid structures, such as novel ferromagnetic-superconducting multilayers
- Giant magnetoresistance and exchange-coupled magnetic multilayers
- Colossal magnetoresistance in naturally layered manganites

### **Experimental Research Areas:**

Surface Magnetism; Metal-on-Metal Epitaxy; Magneto-Optics;  
Surface Physics; Electron Spectroscopies; Superconductivity;  
Synchrotron-Radiation Instrumentation; Magnetism;  
(Neutron Scattering; Lattice Dynamics; Low-Temperature Physics)

### **Selected Recent Publications:**

Hoffmann, S. D. Bader, Opportunities at the Frontiers of Spintronics, *Phys. Rev. Applied* **4**, 047001 (2015).

Leyi Zhu, Yaohua Liu, F. S. Bergeret, J. E. Pearson, S. G. E. te Velthuis, S. D. Bader and J. S. Jiang Unanticipated proximity behavior in ferromagnet/superconductor heterostructures with controlled magnetic non-collinearity”, *Phys. Rev. Lett.* **110**, 177001 (2013).

S. Jain, V. Novosad, F. Y. Fradin, J. E. Pearson, V. Tiberkevich, A. N. Slavin and S. D. Bader, “From chaos to selective ordering of vortex cores in interacting mesomagnets”, *Nature Commun.* **3**,1330 (2012).

J. S. Jiang, J. E. Pearson, and S. D. Bader, "Direct Determination of Energy Level Alignment and Charge Transport at Metal/Alq<sub>3</sub> Interfaces via Ballistic-Electron-Emission Spectroscopy", *Phys. Rev. Lett.* **98**, 072505 (2011).

Yaohua Liu, S. G. E. te Velthuis, J. S. Jiang, Y. Choi, S. D. Bader, A. A. Parizzi, H. Ambaye, and V. Lauter, "Magnetic Structure in Fe/Sm-Co exchange spring bilayers with intermixed interfaces", *Phys. Rev. B* **83**, 174418 (2011).

S. D. Bader and S. S. P. Parkin, "Spintronics" *Ann. Rev. Cond. Matt. Phys.* **1**, 71 (2010).

D. H. Kim, E. A. Rozhkova, I. Ulasov, S. D. Bader, T. Rajh, M. Lesniak, and V. Novosad, "Biofunctionalized magnetic vortex microdisks for targeted cancer cell destruction", *Nature Materials*. **9**, 165 (2010).

O. Mosendz, J. E. Pearson, F. Y. Fradin, G. E. W. Bauer, S. D. Bader, and A. Hoffmann, "Quantifying spin Hall angles from spin pumping: Experiments and Theory", *Phys. Rev. Lett.* **104**, 046601 (2010).

S. J. May, P. J. Ryan, J. L. Robertson, J.-W. Kim, T. S. Santos, E. Karapetrova, J. L. Zarestky, X. Zhai, S. G. E. te Velthuis, J. N. Eckstein, S. D. Bader, and A. Bhattacharya, "Enhanced ordering temperatures in antiferromagnetic manganite superlattices", *Nature Materials* **8**, 892-897 (2009).

P. Cadden-Zimansky, Ya. Bazaliy, L. M. Litvak, J. S. Jiang, Jiyeong Gu, C.-Y. You, M. R. Beasley, and S. D. Bader, "Asymmetric Ferromagnet-Superconductor-Ferromagnet Switch", *Phys. Rev. B* **77**, 184501 (2008).

S. D. Bader, "Colloquium: Opportunities in Nanomagnetism", *Rev. Mod. Phys.* **78**, 1-15 (2006).

G. Srajer, L. H. Lewis, S. D. Bader, A. Epstein, C. S. Fadley, E. E. Fullerton, A. Hoffmann, J. B. Kortright, K. M. Krishnan, S. A. Majetich, T. S. Rahman, C. A. Ross, M. B. Salamon, I. K. Schuller, T. C. Schulthess, and J. Z. Sun, "Advances in Nanomagnetism via X-ray Techniques" (REVIEW), *J. Magn. Magn. Mater.* **307**, 1-31 (2006).

Chinmei Liu, Seok-Hwan Chung, April Sutton, Funing Yan, Qiaoling Jin, A. Hoffmann, B. K. Kay, S. D. Bader, L. Makowski, and Liaohai Chen, "Magnetic Viruses via Nano-Capsid Templates", *J. Magn. Magn. Mater.* **302**, 47 (2006).

K. Yu Guslienko, X. F. Han, D. J. Keavney, R. Divan, and S. D. Bader, "Magnetic Vortex Core Dynamics in Cylindrical Ferromagnetic Dots", *Phys. Rev. Lett.* **96**, 067205 (2006).

K. S. Buchanan, P. E. Roy, M. Grimsditch, F. Y. Fradin, K. Yu. Guslienko, S. D. Bader, and V. Novosad, "Soliton-pair dynamics in patterned ferromagnetic ellipses", *Nature Physics*. **1**, 172 (2005).

Jiyeong Gu, S. D. Bader, H. Zheng, J. F. Mitchell, and J. Gordon, "Heat Capacity of Naturally Layered SrO(La<sub>1-x</sub>Sr<sub>x</sub>MnO<sub>3</sub>)<sub>2</sub> Single Crystals", *Phys. Rev. B* **70**, 054418 (2004).

M. R. Fitzsimmons, S. D. Bader, J. A. Borchers, G. P. Felcher, J. K. Furdyna, A. Hoffman, J. B. Kortright, I. K. Schuller, T. C. Schulthess, S. K. Sinha, M. F. Toney, D. Weller, and S. Wolf, "Neutron Scattering Studies of Nanomagnetism and Artificially Structured Materials" (REVIEW), *J. Magn. Magn. Mater.* **271**, 103-146 (2004).