QPhysics
AT QUEENS COLLEGE

Colloquium Notice

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Random fields and topology

Recently it has been understood that the effect of random fields on the long-range order in systems with continuous-symmetry order parameter is controlled by topology. The *n*-component order parameter in *d* dimensions, interacting with the random field, exhibits glassy behavior at $n < d + 1$ due to the pinning of singularities. Nonsingular topological objects at $n = d + 1$ provide weak metastability. At $n > d + 1$ topological defects are absent and the behavior of the system is fully reversible, characterized by the exponential decay of correlations. Topological arguments have been confirmed numerically on lattices of up to one billion sites. Along these lines the effects of magnetic impurities on the ferromagnetic order and random anisotropy effects in amorphous and sintered magnets have been studied. Our findings also shed new light on properties of pinned charge density waves and properties of pinned flux lattices in superconductors.

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1. D. A. Garanin, E. M. Chudnovsky, and T. C. Proctor, The Role of Vortices in the Three-Dimensional Random-Field XY Model, Europhysics Letters **103**, 67009 (2013).

2. D. A. Garanin, E. M. Chudnovsky, and T. C. Proctor, Random-Field XY Model in Three Dimensions, Physical Review B **88**, 224418 (2013).
3. T. C. Proctor, D. A. Garanin, and E. M. Chudnovsky, Random Fields, Topology, and the Imry-Ma Argument, Physical Review Letters **112**, 097201 (2014).

4. D. A. Garanin and E. M. Chudnovsky, Ordered vs Disordered States of the Random-Field Model in Three Dimensions, European Physics Journal B **88**, 81 (2015).

5. T. C. Proctor, E. M. Chudnovsky, and D. A. Garanin, Scaling of Coercivity in a 3d Random Anisotropy Magnet, Journal of Magnetism and Magnetic Materials **384**, 181 (2015).
6. T. C. Proctor and E. M. Chudnovsky, Effect of Dilute Random Field on Continuous Symmetry Order Parameter, Physical Review B **91**, 140201(R) (2015).

Monday
October 19, 2015
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326