

INDUCED MAGNETIC AND SUPERCONDUCTING PHENOMENA IN NANOSTRUCTURED HETERO MATERIALS

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The interaction between dissimilar magnetic and superconducting structures has produced much new physics in a variety of configuration. This includes new behavior when dissimilar magnetic materials (such as ferromagnets and antiferromagnets) are in contact with each other giving rise to Exchange Bias [1] or when nanostructured superconductors and magnets are in close proximity giving rise to collective pinning [2]. Particularly interesting behavior is obtained when one or both of the constituents have their dimensionality reduced to the nanoscale in one or two dimensions. This gives rise to interesting effects such as the developments of bistable superconductivity[3], long-range fractal order [4], and quantum matching between the superconducting vortex lattice and the artificially prepared nanostructured arrays [5]. These systems also have important implications for the physics of epitaxial growth, and charged plasmas in confined geometries.

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