

SCREENING, AHARONOV - BOHM EFFECT,  
AND LINKING NUMBER IN SPIN SYSTEMS

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Screening mechanisms and related effects are studied in a variety of spin systems coupled to an external magnetic field. We use a special order parameter which can distinguish between screening due to the kinetic energy of spin excitations and screening due to the magnetic field. The action of this order parameter is based on an analog of the Aharonov - Bohm (AB) effect. The order parameter may test the realization of discrete symmetries embedded into the group symmetry of the theory via probing a nontrivial discrete charge. As simple examples, we study the Gaussian and Ising models. For the latter, we performed also Monte-Carlo simulations for a constant magnetic field. We then apply our results to spin systems with abelian and nonabelian global symmetries in two dimensions and argue that the order parameter proposed could serve as a tool to detect the Berezinskii - Kosterlitz - Thouless (BKT) phase transition.