



# "Soft-Matter Seminar"

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## **Title:**

Quantum Surprises: Cross-Component Spin Correlations,  
Spin-Glass Ferromagnetism, and Superconductor/Antiferromagnet Reverse Impurity Effects

## **Abstract:**

It is highly interesting to find quantum effects at finite (i.e., non-zero) temperatures that run contrary to our classical experiences. Such phenomena have recently been found in statistical physics, using the renormalization-group method: In quantum Heisenberg magnetic systems, it is found that the interaction between one type of spin component influences the correlation between another type of spin component, in a direction opposite to classical expectation.[1] In quantum spin glasses with an equal repartition of ferromagnetic and antiferromagnetic bonds, the system nevertheless orders ferromagnetically, due to quantum effects.[2] In electronic conduction models, non-magnetic impurities have opposite effects on the superconducting and antiferromagnetic phases.[3] The latter phenomenon have also been observed experimentally.

[1] O.S. Saryer, A.N. Berker, and M. Hinczewski, Phys. Rev. B 77, 134413 (2008).

[2] C.N. Kaplan and A.N. Berker, Phys. Rev. Lett. 100, 027204 (2008).

[3] M. Hinczewski and A.N. Berker, <http://arxiv.org/abs/cond-mat/0607171v2> [cond-mat.str-el].

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