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Uncompensated Moments in Antiferromagnets and Intrinsic Exchange Bias

The microscopic mechanism of exchange bias, a proximity effect between a ferromagnet (FM) and an antiferromagnet (AF), remains a puzzle after over 50 years since the discovery of the phenomenon. This mechanism is at least as intriguing as that of the high- T_C superconductors. One of the unsolved issues is the origin of the pinned uncompensated magnetic moments in the AF.

In a systematic study of FM-AF exchange-bias systems with FeF_2 as an AF, we confirm the existence of the uncompensated magnetization in the AF. The depth profile of this magnetization measured using polarized neutron scattering indicates presence of the uncompensated magnetization near the surface and in the “bulk” of the FeF_2 layer. [1] We find that the uncompensated magnetization is present even in the *AF-only* samples and it exhibits rather unusual properties, including *intrinsic exchange bias*. The origin and properties of this uncompensated magnetization and its role in the exchange bias will be discussed.

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- [1] M. R. Fitzsimmons *et al.* Phys. Rev. B **75**, 214412 (2007),
[2] M. R. Fitzsimmons *et al.* Phys. Rev. B **77**, 224406 (2008).

Friday, January 28, 2011
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