Abstract **TITLE:** Planar domain walls in exchange biased bilayers

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ABSTRACT BODY: Hysteresis loop shifts away from zero field to negative or positive field values, asymmetrical magnetization reversal processes for descending and ascending fields, and increased coercivity are only a few of the changes that are observed in the hysteresis loop of a ferromagnetic thin film grown on an antiferromagnetic layer after field cooling the system through the Neel temperature of the antiferromagnet. To describe the changes induced by the field cooling or "exchange biasing" a number of models have been proposed emphasizing the role of planar domain walls in the ferromagnetic [1] and antiferromagnetic [2] layer. Combining soft x ray magnetic circular and linear dichroism measurements allows us to monitor the magnetic order in the ferromagnetic and antiferromagnetic layers, respectively, and to test the applicability of these models to a variety of systems:
+ Monitoring the magnetization reversal in a thin Co layer inserted at different depth in a Fe layer grown on FeF_2 allows us to determine a depth profile of the magnetization reversal the ferromagnetic layer. We observe that the angle between bias direction and magnetization vector - obtained by measuring the magnetization component parallel and perpendicular to the applied field - is reduced near the Fe/FeF_2 interface as compared to the surface of the ferromagnetic Fe layer. This suggests the formation of a partial parallel domain wall in the Fe layer.
+ Scholl *et al.* [3] presented evidence for the formation of an antiferromagnetic exchange spring in a NiO single crystal exchange coupled to a Co thin film using magnetic linear dichroism. In a similar experiment on Co/MnF_2 and Ni/FeF_2 bilayers, we observe a very small magnetic linear dichroism at the Mn L_3 edge indicating the rotation of the Mn spins upon magnetization reversal in the Co layer. However, no indication for the formation of an antiferromagnetic domain wall in FeF_2 was found. We attribute and will discuss this difference in behaviour in terms of anisotropy fields of the antiferromagnetic layer (14.9 T in FeF_2 and 0.7 T in MnF_2).

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