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**The relationship between the sign of exchange bias and the magnetization depth profile of Co/$FeF_2$** MICHAEL FITZSIMMONS, BRIAN KIRBY, Los Alamos National Laboratory, Los Alamos NM 87545, SUJOY ROY, ZHI-PAN LI, IGOV V. ROSHCHIN, R. MORALES, S.K. SINHA, IVAN K. SCHULLER, Department of Physics, University of California at San Diego, La Jolla CA 92093 — We have used the unique spatial sensitivity of polarized neutron beams in reflection geometry to measure the depth dependence of magnetization across the interface between a ferromagnet (Co) and an antiferromagnet ($FeF_2$). Our Co/$FeF_2$ bilayer sample is one that exhibits either positive or negative exchange bias depending upon the magnitude of the cooling field. For positive exchange bias, pinned magnetization at the Co/$FeF_2$ interface is directed opposite to the cooling field, while in the $FeF_2$ bulk, the net pinned magnetization is parallel to the cooling field. For negative exchange bias, the net pinned magnetization near the Co/$FeF_2$ interface is parallel to the direction of the cooling field. We propose a model that explains the cooling field dependence of the sign of exchange bias. Work at LANL and UCSD was funded by the U.S. Department of Energy, BES-DMS, and by a University of California Campus-Laboratory Collaboration grant.

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