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Aging and random-field magnetism in ferromagnet/antiferromagnet bilayers.[1] TIANYU MA, RYAN FREEMAN, XIANG CHENG, STEFAN BOETTCHER, SERGEI URAZHDIN, Emory University — Exchange interaction at the interface between a ferromagnet (F) and an antiferromagnet (AF) results in a random effective exchange field acting on both F and AF [1], which can produce complex equilibrium and dynamical states. We utilized anisotropic magnetoresistance to look for signatures of such states in epitaxial Py=Permalloy/Fe50Mn50 and polycrystalline CoO/Py bilayers. For thin AF layers, both systems exhibit slow cooperative aging indicative of a complex glassy state [2]. Aging follows the same small power-law or logarithmic dependence and is observed over a wide range of temperatures and fields, suggesting a universal aging mechanism. Glassy relaxation is not observed at any temperature for AF thickness above 3.5nm. We argue that these observations are inconsistent with the usual "granular" and "domain-state" models of F/AF systems. We discuss the implications of our results for the random field magnetism, and the relationship between the dimensionality and the topological properties of magnetic systems.

1. A.P. Malozemoff, Phys. Rev. B 35, 3679(R) (1987).

2. T.C. Proctor, D.A. Garanin, and E.M. Chudnovsky, Phys. Rev. Lett. 112, 097201 (2014).

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