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Length Scale Dependence of Glassy Dynamics at the Mesoscale[1]
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— We have measured glassy dynamics for thin film mesoscopic CuMn multilayers, with CuMn thicknesses of 4.5 nm, 9.0 nm, and 20 nm. We compare our experimental results with the predictions for the growth rate of the spin glass correlation function for two spin glass dynamical models: power law and activated dynamics. The former predicts a logarithmic dependence of the maximum energy barrier height on length scale; the latter a power law dependence. In addition, the freezing temperature was measured for the three thin film thicknesses, and compared with the predictions of the two models. We find that power law dynamics can fit the length scale dependence of the maximum barrier height, while activated dynamics predicts a variation outside of the experimentally determined range. A similar conclusion is reached for the freezing temperature. In all, measurement of the length scale dependence of spin glass dynamics at the mesoscale proves to be a powerful tool for distinguishing between conflicting dynamical models.

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