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Time Dependence of the freezing temperature for thin film spin glasses[1] RAYMOND ORBACH, The University of Texas at Austin — There have been many measurements of the dependence of the "freezing temperature", T_f, on the thickness $\mathcal{L}$ of thin film spin glasses. T_f decreases with decreasing $\mathcal{L}$, but never vanishes. This contribution suggests that the dependence of T_f on $\mathcal{L}$ is a time dependent relationship. Because the lower critical dimension of a spin glass, $d_\ell \approx 2.5$, when the spin glass correlation length $\xi(t,T)$ grows to $\mathcal{L}$, the spin glass dimensionality crosses over from $d = 3$ to $d = 2$. What remains are spin glass correlations for length scales $\leq \mathcal{L}$. The time dependence of the magnetization dynamics are then activated, with activation energy equal to a largest barrier $\Delta_{max}(\mathcal{L})$, and an associated activation time τ. For measurements at time scales such that $\xi(t,T) < \mathcal{L}$, the effective dimension $d = 3$, and the characteristic cusp and knee of a spin glass is observed. For experimental time scales greater than τ, with $\xi(t,T) \approx \mathcal{L}$, the zero-field cooled magnetization has grown to the field-cooled value of the magnetization, leading to the identification of T_f. Quantitative agreement with experiment is exhibited.

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