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Numerical evidence against both mean field and droplet scenarios of the Edwards-Anderson model JULIO F. FERNANDEZ, Universidad de Zaragoza, Spain, JUAN J. ALONSO, Universidad de Granada, Spain — From tempered Monte Carlo simulations, we have obtained accurate probability distributions $p(q)$ of the spin-overlap parameter q for finite Edwards-Anderson (EA) and Sherrington-Kirkpatrick (SK) spin-glass systems at low temperatures. Our results for $p(q)$ follow from averages over 10^5 disordered samples of linear sizes $L = 4-8$ and over 15 000 samples for $L = 10$. In both the SK and EA models, at temperatures as low as $0.2T_{sg}$, where T_{sg} is the transition temperature, $p(q)$ varies insignificantly with L. This does not fit the trend that the droplet model predicts for large L. We have also calculated correlation functions, $F(q_1, q_2)$, from which rms deviations, δp, over different realizations of quenched disorder, as well as thermal fluctuations, w, of q values, follow. Our numerical results for δp and w scale as $\sqrt{L}$ and $1/L$, respectively, in the SK model. This fits in well with mean field predictions. On the other hand, our data for w and δp vary little, if at all, for the EA model.

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