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Low temperature solution of the Sherrington-Kirkpatrick model
SERGEY PANKOV, NHMFL, FSU, Tallahassee — We propose a simple scaling ansatz for the full replica symmetry breaking solution of the Sherrington-Kirkpatrick model in the low energy sector. This solution is argued to become exact in the limit $x \to 0$, $\beta x \to \infty$ of the Parisi replica symmetry breaking scheme parameter x. The distribution function $P(x, y)$ of the frozen fields y has been known to develop a linear gap at zero temperature. We integrate the scaling equations to find an exact numerical value for the slope of the gap $\partial P(x, y)/\partial y|_{y\to 0} = 0.301046...$ We also use the scaling solution to devise an inexpensive numerical procedure for computing finite timescale ($x = 1$) quantities. The entropy, the dynamical susceptibility at zero frequency and the local field distribution function are computed in the low temperature limit with high precision, barely achievable by other currently available methods.

Sergey Pankov
NHMFL, FSU, Tallahassee

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