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Spectral Gap estimates in mean field spin glasses

A central prediction in the study of spin glasses is that for any local reversible dynamics, one expects an exponential time to equilibrium in the spin glass phase. We prove this prediction for a broad class of Ising spin and spherical spin glass models. We present a single framework to prove these estimates that applies equally in the discrete and manifold settings by formalizing the notion of “free energy barriers” whose presence imply exponentially slow mixing. We then present sufficient conditions which imply the existence of these barriers for a large class of mean field spin glass models using the notions of the “replicon eigenvalue”, the 2D Guerra—Talagrand bounds, and a quenched LDP for the overlap distribution. We these sufficient conditions cover large classes of spin glass models, e.g., p-spin models. I will report on two recent joint works with G. Ben Arous (NYU) and R. Gheissari (NYU).