Spatially heterogeneous RSB in layered p-spin models

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Purpose: To study the replica symmetry breaking (RSB) phenomenology in a minimalistic model of quasi 1-dimensional spin glasses (SGs).

Outline: Using the k-step RSB theory, we exactly solve a generalization of the canonical p-spin SG model. The theory produces k-fold nested integral equations that are solved numerically. We also perform Monte Carlo (MC) simulations using multicore parallel tempering algorithm.

Result: The numerical analysis shows that the model exhibits a rich RSB phenomenology. At low temperatures the model undergoes layer-wise cascades of glass transitions that break the phase space up into complex clusters: full RSB+k-RSB at the edges and replica symmetric liquid in the bulk. The MC simulations of the model support the theoretical predicitons (see Fig. 1).

System: SQUID

T=0.644

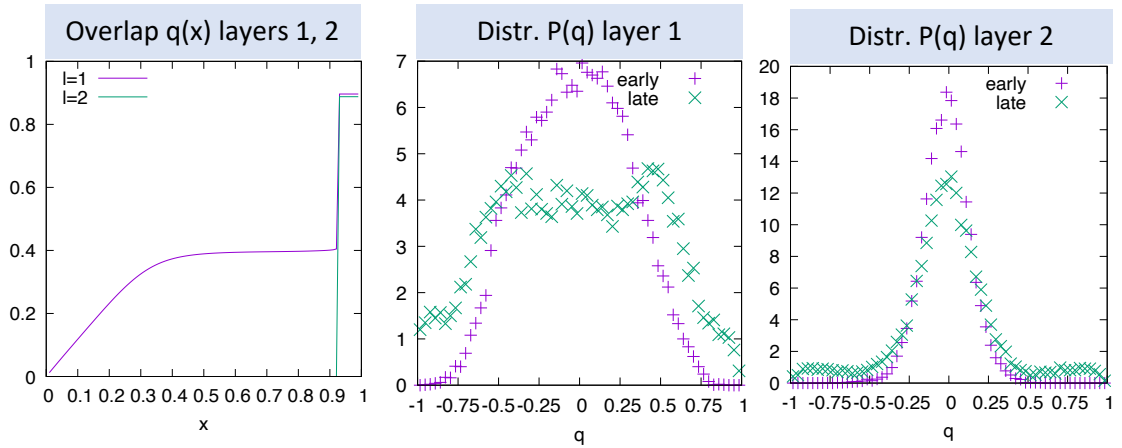

Fig. 1. Numerically obtained overlap q(x), and distribution P(q) obtained via MC simulations (L=3, c=32, N=64 at temperature T=0.644)