

Semerjian

Quantum spin models on sparse random graphs

Classical spin models defined on random graphs have been the object of an intense research activity motivated, among other reasons, by their relationship to random combinatorial optimization problems. The cavity method allowed to make several qualitative and quantitative predictions about the behaviour of such random systems in their large size limit, some of these predictions having been confirmed rigorously. In this talk I will discuss a more recent development of the cavity method towards quantum models defined on random graphs. These models can be constructed, for instance, by turning a classical energy function of N Ising spins into an operator acting on the Hilbert space spanned by the 2^N configurations, and adding to it a non-commutative operator as a transverse field. Such models can be represented through path-integrals of imaginary time configurations. The cavity method can then be implemented at the quantum level by devising a sampling procedure of such spin trajectories, a procedure that can also be useful for Monte Carlo simulations.