

Zamponi

Title: Level crossings, first order transitions and the role of entropy

I will introduce a simplified model of a quantum optimization problems, based on the random subcubes model of Mora and Zdeborova, where quantum fluctuations correspond to a transverse field acting on the qubits.

I will show that the quantum Hamiltonian has a very complex low-energy spectrum, with a spin glass phase at low gamma characterized by a continuum of level crossings as a function of the transverse field.

At a critical value of the transverse field, there is a first order phase transition

between this complex phase and a simple quantum paramagnet.

The gap is always exponentially small in the spin glass phase, while it is finite

in the quantum paramagnet.