SEMPARIS – Séminaires en région parisienne

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Cours

Vendredi 10 Novembre 2017, 10 :00
IPHT, Salle Claude Itzykson, Bât. 774(https ://courses.ipht.cnrs.fr/ ?q=fr/node/194)
Domaines : cond-mat

Titre : *Statistical physics of glassy systems : tools and applications (1/6)*

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Résumé : *The complex behavior of a large variety of systems can often be ascribed to the competition of many quasi-optimal equilibria. In these cases metastability deeply affects both the structural and dynamical properties. Glasses are the prototype of such systems, with glassy behavior arising not only in condensed matter but also in a wide variety of fields ranging from optimization to computer science.*

In these lectures I will introduce different kinds of glassy systems and I will describe their fundamental similarities, which emerge from their statistical description. Then I will focus on a representative model, the random perceptron, and I will discuss the main techniques that can be used to solve it.

These techniques provide a versatile theoretical toolbox that can be applied to several problems such as for example the physics of the jamming transition, its interpretation in the context of constraint satisfaction, as well as the design of new efficient algorithms to solve statistical problems.

1.Introduction to glassy systems : structural glasses and constraint satisfaction problems.

2.The random perceptron model. The replica approach. The replica symmetric solution and phase diagram.

3.Replica symmetry breaking and marginal stability. The full RSB solution of the random perceptron.

4.The jamming transition as a satisfiability threshold ; critical exponents.

5.Belief propagation approach and the algorithmic version of the Thouless-Anderson-Palmer equations.

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