

Università degli Studi di Pavia
DOTTORATO DI RICERCA IN FISICA

CORSO DI SEMINARI DI INDIRIZZO TEORICO

A.A. 2006/2007

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Sala Riunioni INFN, Dipartimenti Fisici, via Bassi 6

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Phase transitions in Information Theory and Optimization

ABSTRACT:

Many disciplines have at their root random Constraint Satisfaction Problems (CSPs). A random CSP is characterized by an extensive list of constraints, each one forbidding some of the joint assignments of the (discrete) variables it involves. In Information Theory, these are used to design error correcting codes, whereas in Computer Science they constitute elementary models for studying the onset of exponential regimes in algorithms. More generally, random CSPs capture some of the optimization aspects of complex systems in physics (e.g. spin-glasses and packing problems), in economics (e.g. financial markets), and in biology (e.g. gene networks and learning in neuroscience).

In this talk we will focus on a new class of message passing algorithms, which originate from the cavity method of statistical physics and are able to deal with ergodicity breaking and clustering of solutions taking place in random CSP. Such algorithms allow to derive both analytic solutions and a completely new (and powerful) algorithmic framework.

Gli studenti di Dottorato e tutti gli interessati sono cordialmente invitati

Annalisa Marzuoli
Titolare del Corso