

STANFORD PROBABILITY SEMINAR

Marc Mezard, MSRI and CNRS-Universite Paris Sud

Monday, 14 March 2005

4:15pm (Refreshments at 4pm in the 1st Floor Lounge)

Sequoia Hall, Room 200

Statistical physics approach to satisfiability

Abstract. The phase transition in random K -satisfiability problems is a very important phenomenon both from the point of view of physics and from that of computational complexity. This talk exposes the analysis of this transition using the cavity method, developed in spin glass theory. It predicts the existence of an intermediate phase, when the density of constraints is smaller than the critical threshold, where satisfying assignments cluster in well separated regions. The cavity analysis can be turned into an algorithm, ‘survey propagation’, which succeeds in finding satisfiable assignments in very large formulas quite close to the threshold.