

Seminar in Nonlinear Systems

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*The hard-core model in statistical physics,
communications networks and computer science*

Tuesday, December 16, 2003

4:00 pm

Pierce 218

Abstract: The hard-core model is a probability measure on the independent sets of a graph in which each independent set I is chosen with probability proportional to $a^{|I|}$, where a is some positive parameter. (An independent set in a graph is a set of vertices, no two of which are joined by an edge).

This model originally arose in statistical physics, where it describes a gas with particles of non-negligible size. It was rediscovered in the field of communications, where it models a network that supports broadcast or conference calls. It has recently become an object of study in the theoretical computer science community, where the main interest is in describing algorithms which efficiently sample from the above measure.

In this talk I will introduce the hard-core model, and discuss the related concepts of phase co-existence (from statistical physics), spatial fairness (from communications networks), and mixing times of Monte Carlo Markov chain algorithms (from computer science).

This is joint work partly with Jeff Kahn of Rutgers and partly with Prasad Tetali of Georgia Tech.

Refreshments at 3:50pm