



MSRI Evans Talk

Monday, March 7, 2005, 4:15 pm

to be held in 60 Evans on the UCB campus

“Hunting for Sharp Thresholds”

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As the participants of this workshop are well aware, threshold phenomena are abundant in fields of science where randomness plays a role, be it statistical physics, computer science or combinatorics. A basic rule of thumb, that can be made precise, is that these thresholds in random structures are sharp when they correspond to *global* properties (such as graph connectivity) and coarse when they correspond to *local* properties (such as having a specific small configuration appear in a random graph.) We will explain how to formalize this idea and how to apply it in order to prove that certain properties of random structures display a sharp phase transition when a control parameter varies slightly.

Just to give a concrete example here is a theorem about the random graph $G(n,p)$:
There exists a bounded function $0 < c(n) < 100$ such that for every $\epsilon > 0$
Probability($G(n, (c(n) + \epsilon)/n)$ is four-colorable) $\rightarrow 0$, and
Probability($G(n, (c(n) - \epsilon)/n)$ is four-colorable) $\rightarrow 1$.