

USC Department of Mathematics
PROBABILITY & STATISTICS SEMINAR

3:30 PM, Friday 13.Feb.09
146 Kaprielian Hall
(Refreshments served at 3 PM in KAP 116)

Po-Shen Loh
Department of Mathematics
Princeton University, visiting UCLA

Random graphs, and the power of two choices

Since their introduction half a century ago, probabilistic methods have elegantly provided a wide variety of otherwise difficult to find constructions. Combinatorial applications often employ variants of the Erdős-Rényi random graph $G_{n,p}$, an n -vertex graph obtained by independently placing an edge between each vertex pair with probability p . In addition to being useful for constructions, these objects are interesting in their own right. One beautiful discovery was that many important graph properties appear suddenly: when p crosses a certain threshold, the probability that $G_{n,p}$ satisfies the property jumps from nearly 0 to nearly 1.

Another remarkable probabilistic phenomenon, of separate origin, is known as the “power of two random choices.” When n balls are distributed into n bins by sequentially sending each ball into an independent random bin, then the fullest bin typically contains $\log n / \log \log n$ balls. However, if each ball instead receives two independent random choices of a target bin, and selects the lesser-occupied one, then the maximum occupancy falls dramatically.

In this talk, I will survey the above, and discuss progress (including joint work with M. Krivelevich and B. Sudakov) in a newer model which unites both of the above phenomena. Recent research suggests that the two-choices paradigm also holds in the graph setting, as various authors have shown that thresholds for several classical graph properties can indeed be substantially affected by this power.