

Probability Seminar

Organizer: Tai Melcher & George Kordzakhia

Wednesday, 3:10–4:00pm, 330 Evans

Feb 8 **Asaf Nachmias**, UC Berkeley

The critical random graph, with martingales

The random graph model, $G(n, p)$, is obtained from the complete graph on n vertices by independently retaining each edge with probability p and erasing it with probability $1 - p$. This model was introduced by Erdos and Renyi, who discovered that for $p = c/n$, the largest connected component of $G(n, p)$ undergoes a "double jump" as c grows; its size is of order $\log(n)$ for $c < 1$, of order $n^{2/3}$ for $c = 1$, and linear for $c > 1$. A complete proof for the case $c = 1$ was only given much later (see Luczak, Pittel and Wierman 1994, and Aldous 1997), however all previous proofs of this fact are quite involved.

We present simple proofs of these facts. Our methods also yield a simple proof for a Theorem of Bollobas concerning the supercritical phase, and can be used to analyze other models, such as critical percolation on random regular graphs and on regular expanders.

Joint work with Yuval Peres.