ÉCOLE D'ÉTÉ SMS 2012 ≪ COMBINATOIRE PROBABILISTE ≫
25 JUIN - 6 JUILLET 2012

SMS 2012 SUMMER SCHOOL "PROBABILISTIC COMBINATORICS"
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Colouring random graphs
(3 hours)

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What is the typical behaviour of the chromatic number $\chi(G)$ of a graph G ? If R_n denotes some sort of random graph on n vertices, can we determine a function $f(n)$ such that $\chi(R_n)/f(n) \to 1$ in probability as $n \to \infty$? If so, what is $f(n)$? Can we bound the typical spread of the values $\chi(R_n)$? Is $\chi(R_n)$ usually close to $\omega(R_n)$, the maximum size of a complete subgraph ?

We shall consider various models of random graph, but mainly we shall focus on the classical Erdös-Rényi or Bernouilli random graph $G(n,p)$ (both in the dense case when p is a constant and in the sparse case when np is constant), and on random geometric graphs. Also, mostly we shall focus on chromatic number, but we shall briefly discuss related quantities, such as edge chromatic number (chromatic index), list chromatic number, total chromatic number, achromatic number, improper chromatic number, and span.

In particular we shall meet recent results giving improved estimates for $\chi(G(n,p))$ in the dense case ; and see a 'phase change' for colouring random geometric graphs. What about a random graph sampled uniformly from all n vertex graphs with at most 3 vertex-disjoint cycles ?

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