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*** UCLA Combinatorics Seminar ***
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Date: Thursday, May 15, 1.50-2.50 in Room 6943

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The Ramsey multiplicity of complete graphs

Abstract

In this talk we treat the following question: given a fixed t, how many monochromatic copies of K_t must one find in any two-colouring of the edges of K_n (for n large)? This is an old question of Erdős, and he proved bounds that essentially mirror the known bounds for Ramsey's theorem. In particular, for the upper bound, he showed that one has at least

$$\frac{n^t}{r(t)^t} \geq \frac{n^t}{4^{t^2}}$$

monochromatic copies of K_t.

Our main result is a large improvement on this lower bound, increasing it to

$$\frac{n^t}{C^{t^2}},$$

where $C \approx 2.18$ is an explicitly defined constant. The proof involves the construction of a recursion which we believe to be the correct analogue, for multiplicites, of the Erdős-Szekeres proof of Ramsey's theorem. The solution of this recursion is, however, markedly more complicated than that of its counterpart.