A Lower bound for set-colouring ramsey numbers

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The set-colouring Ramsey number $R_{r,s}(k)$ is defined to be the minimum n such that if each edge of the complete graph Kn is assigned a set of s colours from $\{1, \ldots, r\}$, then one of the colours contains a monochromatic clique of size k. The case s = 1 is the usual r-colour Ramsey number, and the case s = r 1 was studied by Erds, Hajnal and Rado in 1965, and by Erds and Szemerédi in 1972.

The first significant results for general s were obtained only recently, by Conlon, Fox, He, Mubayi, Suk and Verstraëte, who showed that $R_{r,s}(k) = 2^{\Theta(kr)}$ if s/r is bounded away from 0 and 1. In the range s = r o(r), however, their upper and lower bounds diverge significantly. In this talk we introduce a new (random) colouring, and use it to determine $R_{r,s}(k)$ up to polylogarithmic factors in the exponent for essentially all r, s and k.

This is a joint work with Lucas Aragão, Maurício Collares, João Pedro Marciano and Rob Morris.