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**GRAEME KEMKES**, University of California, San Diego, 9500 Gilman Drive 0112, La Jolla, CA 92093-0112, USA

*The chromatic number of a random  $d$ -regular graph*

Achlioptas and Moore recently announced a proof that a random  $d$ -regular graph asymptotically almost surely (a.a.s.) has chromatic number  $k - 1$ ,  $k$ , or  $k + 1$ , where  $k$  is the smallest integer satisfying  $d < 2(k - 1) \log(k - 1)$ . In this paper we prove that, asymptotically almost surely, it is not  $k + 1$ . This provides an alternate proof of the results of Shi and Wormald that the chromatic number of a random 4-regular graph is a.a.s. 3 and, for a random 6-regular graph, a.a.s. 4. It also establishes, for example, the previously-unknown result that the chromatic number of a random 10-regular graph is a.a.s. 5.

Our proof applies the small subgraph conditioning method to the number of balanced  $k$ -colourings, where a colouring is *balanced* if the number of vertices of each colour is equal.

This is joint work with Xavier Pérez and Nick Wormald.