The chromatic number of a random lift of K_d

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An n-lift of a graph G is a graph from which there is an n-to-1 covering map onto G. Amit, Linial, and Matoušek (2002) raised the question of whether the chromatic number of a random n-lift of K_5 is concentrated on a single value. We consider a more general problem, and show that for fixed $d \geq 3$ the chromatic number of a random lift of K_d is (asymptotically almost surely) either k or $k + 1$, where k is the smallest integer satisfying $d < 2k \log k$. Moreover, we show that, for roughly half of the values of d, the chromatic number is concentrated on k. The argument for the upper-bound on the chromatic number uses the small subgraph conditioning method, and it can be extended to random n-lifts of G, for any fixed d-regular graph G. (This is joint work with JD Nir.)