1038-60-187 **David Galvin***, University of Notre Dame, Department of Mathematics, 255 Hurley Hall, Notre Dame, IN 46556. *Sampling 3-colourings of the discrete torus.*

We look at ρ-local Markov chains for sampling uniform 3-colourings of the discrete torus $T_{L,d} = \{1, \ldots, L\}^d$. These are chains which change the state of no more than a proportion ρ of the vertices of $T_{L,d}$ at each step. We show that as long as ρ isn't too large, the mixing time of such chains is exponentially slow in the surface area of the torus (joint work with D. Randall). This extends a recent result (joint with J. Kahn, D. Randall and G. Sorkin) to the effect that the 3-colouring model on $\mathbb{Z}^d$ exhibits multiple Gibbs phases (i.e., that the colouring on the boundary of a large box in the lattice can continue to influence the colouring at the center of the box, in the limit as the boundary goes to infinity). (Received February 08, 2008)