Random Majority Percolation

We consider discrete time random majority bootstrap percolation on the n by n torus, in which, at each time step t, every vertex goes into the state the majority of its neighbours had at time $t-1$ with a small chance p of error independently of all other events. We shall that, if n is fixed and p is sufficiently small, then the process spends almost half of its time in each of two configurations. Further, we show that the expected time for it to reach one of these configurations from the other is $\Theta(1/p^{n+1})$ despite the actual time spent in transit being $O(1/p^3)$. These results are far beyond anything obtainable by simulation.

This is all joint work with Paul Balister, Béla Bollobás and Robert Johnson.