1063-60-265 **Jason P Miller*** (jmiller@math.stanford.edu), CA , and **Yuval Peres** (peres@microsoft.com). *Uniformity of the Uncovered Set of Random Walk and Cutoff for Lamplighter Chains.*

We show that the measure on markings of $\mathbb{Z}_n^d$, $d \geq 3$, with elements of $\{0,1\}$ given by iid fair coin flips on the range $\mathcal{R}$ of a random walk X run until time T and 0 otherwise becomes indistinguishable from the uniform measure on such markings at the threshold $T = \frac{1}{2}T_{\rm cov}(\mathbb{Z}_n^d)$. As a consequence of our methods, we show that the total variation mixing time of the random walk on the lamplighter graph $\mathbb{Z}_2 \wr \mathbb{Z}_n^d$, $d \geq 3$, has a cutoff with threshold $\frac{1}{2}T_{\rm cov}(\mathbb{Z}_n^d)$. We give a general criterion under which both of these results hold; other examples for which this applies include bounded degree expander families, the intersection of an infinite supercritical percolation cluster with an increasing family of balls, the hypercube, and the Caley graph of the symmetric group generated by transpositions. The proof also yields precise asymptotics for the decay of correlation in the uncovered set. (Received August 17, 2010)