CLUSTER SIZES FOR THE VACANT SETS OF RANDOM WALK ON A TORUS

SUBHAJIT GOSWAMI

Consider a simple random walk on a discrete torus of large side length N in dimensions ≥ 3 starting from a uniform point. When the walk runs for a time $u N^d$ for some $u > 0$, the corresponding vacant set, i.e. the set of points not visited by the walk, undergoes a percolation phase transition across a value $u_* \in (0, \infty)$. In this talk we will discuss some recent results on the largest and second largest diameter of a vacant cluster in the subcritical ($u > u_*$) and supercritical ($u < u_*$) regime respectively. Interestingly, both these diameters grow at rate $\log N \log \log N$ in dimension 3 whereas in all higher dimensions they grow at a slightly slower, albeit "more familiar", rate $\log N$. Furthermore in dimension 3, we can compute the precise prefactor in front of $\log N \log \log N$ which turns out to depend symmetrically on u on either side of u_* and diverges polynomially as $u \to u_*$. Based on upcoming works with Pierre-Francois Rodriguez and Yuriy Shulzhenko.