# The Time of Bootstrap Percolation

**Béla Bollobás**
Cambridge and Memphis

Bootstrap percolation, a simple cellular automaton introduced by Chalupa, Leath and Reich in 1979, can be viewed to model the spread of an infection. Let $G$ be a graph, and for every vertex $x$, let $r(x)$ be a natural number. Starting with a set $A_0$ of 'infected' vertices of $G$ at time 0, in bootstrap percolation with threshold function $r$ the infection spreads according to the following deterministic local update rule: a vertex $x$ with at least $r(x)$ infected neighbours at time $t$ becomes infected at time $t+1$, and every infected vertex remains infected for ever. The set $A$ *percolates* if eventually every vertex of $G$ is infected; the first time when every vertex is infected is the *time of percolation*.

In the past three decades, much work has been done on bootstrap percolation on finite grids of a given dimension in which the initial set $A$ is obtained by selecting its vertices at random, with the same probability $p$, independently of all other choices. The focus has been on the *critical probability*, the value of $p$ at which the probability of percolation is 1/2. The first half of my talk will be a review of some of the fundamental results concerning critical probabilities obtained by Aizenman, Lebowitz, Schonman, Cerf, Cirillo, Manzo, Holroyd and others, and by Balogh, Morris, Duminil-Copin and myself. The second half will about about the very recent results I have obtained with Holmgren, Smith and Uzzell on the time a random initial set takes to percolate.