



Pacific Institute *for the*
Mathematical Sciences

PIMS Public Lecture: Béla Bollobás

Friday, 15 February, 2013

University of British Columbia, Vancouver

3:00 pm MATX 1100

2:30 pm Reception in Math 125

RECENT RESULTS ON BOOTSTRAP PERCOLATION

Béla Bollobás (Cambridge, Memphis and Microsoft)

Bootstrap percolation, one of the simplest cellular automata, can be viewed as an oversimplified model of the spread of an infection on a graph. In the past three decades, much work has been done on bootstrap percolation on finite grids of a given dimension in which the initially infected 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 (eventual full infection) is $1/2$.

The first half of my talk will be a review of some of the fundamental results concerning critical probabilities proved by Aizenman, Lebowitz, Schonman, Cerf, Cirillo, Manzo, Holroyd and others, and by Balogh, Morris, Duminil-Copin and myself. The second half will be about the very recent results I have obtained with Holmgren, Smith, Uzzell and Balister on the time a random initial set takes to percolate.

BÉLA BOLLOBÁS is a Fellow of Trinity College, Cambridge, and the Chair of Excellence in Combinatorics at the University of Memphis. He was born in 1943 in Budapest, where he did his undergraduate work. He holds doctorates from Budapest and Cambridge. He has been a Fellow of Trinity College since 1970, and a Chair of Excellence at Memphis since 1995.

He has worked in several areas, including functional analysis, extremal and probabilistic combinatorics, probability theory, percolation and bootstrap percolation. He has proved numerous fundamental results, including the Bishop-Phelps-Bollobás theorem, the cube theorem (with Thomason), the correct order in the Erdős-Stone theorem (with Erdős), the chromatic number of random graphs, the precise nature of the phase transition in the random graph process (with Erdős), the critical probability of random Voronoi percolation in the plane (with Riordan), the Balister-Bollobás entropy inequality, and the critical probability in bootstrap percolation on grids of any dimension and any infection parameter (with Balogh, Duminil-Copin and Morris). He also introduced the interlace polynomial (with Arratia and Sorkin) and the Bollobás-Riordan polynomial, and defined a very general model of inhomogeneous random graphs (with Janson and Riordan). In addition to over 400 papers, he has written ten books, including *Modern Graph Theory*, *Percolation*, and *The Art of Mathematics*. He has had close to 50 Ph.D. students, including the Fields Medallist Tim Gowers, four professors in Cambridge and two in Oxford.



He is a Fellow of the Royal Society, and a Foreign Member of the Hungarian Academy of Sciences. In 2009 he was awarded the Senior Whitehead Prize of the London Mathematical Society.