



Mathematical Statistics  
Stockholm University  
Research Report **2010:5**,  
<http://www.math.su.se/matstat>

# Long-range percolation on the hierarchical lattice

Vyacheslav Koval, Ronald Meester and Pieter Trapman

April 2010

## Abstract

We study long-range percolation on the hierarchical lattice of order  $N$ , where any edge of length  $k$  is present with probability  $p_k = 1 - \exp(-\beta^{-k}\alpha)$ , independently of all other edges. For fixed  $\beta$ , we show that the critical value  $\alpha_c(\beta)$  is non-trivial if and only if  $N < \beta < N^2$ . Furthermore, we show uniqueness of the infinite component and continuity of the percolation probability and of  $\alpha_c(\beta)$  as a function of  $\beta$ . This means that the phase diagram of this model is well understood.