RANDOM CONDUCTANCE MODELS WITH SUB-DIFFUSIVE HEAT KERNEL DECAY

MAREK BISKUP

I will review some recent (and also not-so-recent) progress on the understanding of the behavior of the random walk on the hypercubic lattice among bounded i.i.d. random, nearest neighbor conductances that have a heavy lower tail at zero. The center of focus of my talk will be the large-n behavior of the probability that the random walk in this random medium returns back to the starting point after $2n$ steps. First I will show that there are universal upper bounds on this probability, which enforce the standard (diffusive) decay in spatial dimensions $d = 2,3$ but permit subdiffusive decay in higher dimensions. Then I will show how one constructs examples for which the decay is actually provably subdiffusive in all $d \geq 4$. In $d = 4$ this is particularly subtle because there one has to control the walk over a whole range of spatial scales. Based on various joint papers with N. Berger, O. Boukhadra, C. Hoffman, G. Kozma and T. Prescott.