EXPONENTIAL DECAY FOR THE EXIT PROBABILITY FROM SLABS OF BALLISTIC RWRE

ALEJANDRO F. RAMÍREZ

Abstract. It is conjectured that in dimensions $d \geq 2$ any random walk in an i.i.d. uniformly elliptic random environment (RWRE) on $\mathbb{Z}^d$ which is directionally transient is ballistic. The ballisticity conditions for RWRE interpolate between directional transience and ballisticity and have served to quantify the gap which would be needed in order to prove afirmatively this conjecture. In 2001 and 2002 Sznitman defined the so called conditions (T) and (T'). The first one is the requirement that certain unlikely exit probabilities from a set of slabs decay exponentially fast with their width L. The second one is the requirement that for all $\gamma \in (0,1)$ condition $(T)_\gamma$ is satisfied, which in turn is defined as the requirement that the decay is like e^{-CL^γ} for some $C > 0$. In this talk we present a proof of a conjecture of Sznitman of 2002, stating that (T) and (T') are equivalent. Hence, this closes the circle proving the equivalence of conditions (T), (T') and $(T)_\gamma$ for some $\gamma \in (0,1)$ as conjectured by Sznitman, and also of each of these ballisticity conditions with the polynomial condition $(P)_M$ for $M \geq 15d + 5$ introduced by Berger, Drewitz and Ramírez in 2014. This is a joint work with Enrique Guerra.

Facultad de Matemáticas, Universidad Católica de Chile, Santiago, Chile, e-mail: aramirez@mat.uc.cl