NON-HOMOGENEOUS RANDOM WALKS IN CRITICAL REJIMES

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Abstract: In this talk we describe recent joint work on non-classical random walks, focusing on (i) zero-drift Markov chains in Euclidean space, whose increment covariance function varies in such a way that the walk can be recurrent (or transient) in any dimension $d \geq 2$; (ii) perturbations of zero-drift walks, including the connection to classical work of Lamperti; (iii) an extension of the Lamperti problem to the case of heavy-tailed increments, including, for example, perturbations of martingales whose increments have infinite variance; (iv) self-interacting proces: random walks that avoid their past convex hull. The methodology is that of Lyapunov functions, and allows one to address in general questions of recurrence, transience, ballisticity, etc.

References

[1] M. Menshikov, S. Popov, A. Wade. Non-homogeneous Random Walks. Cambridge University Press, 2017.