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**Alexander Drewitz\*** ([drewitz@math.columbia.edu](mailto:drewitz@math.columbia.edu)), Department of Mathematics Columbia University, RM 614, MC 4419, 2990 Broadway, New York, NY 10027. *Ballisticity conditions and trapping for higher-dimensional random walk in random environment.*

Random walk in random environment (RWRE) is a fundamental model of statistical mechanics, describing the movement of a particle in a highly disordered and inhomogeneous medium as a random walk with random jump probabilities. It has been introduced around the 70s of the last century in a series of papers as a model of DNA chain replication and crystal growth, and also as a model of turbulent behavior in fluids through a Lorentz gas description. It is a simple but powerful model for a variety of complex large-scale disordered phenomena arising from fields such as physics, biology and engineering. While the one-dimensional model is well-understood, in the multidimensional setting fundamental questions about the RWRE model have resisted repeated and persistent attempts to answer them.

We introduce the model and give an overview over some basic open problems. We proceed to explain the phenomena of ballisticity and trapping in higher dimensions, thereby pointing out some of the progress that has recently been obtained as well as some fundamental questions that still remain open. (Received January 28, 2014)