Cal Poly Pomona

Colloquium Series

Math & Stats Department



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Geometry-induced criticality in p-adic scaling limits of random walks

Abstract: An anisotropy parameter h in (0,1] induces on Q_p^2 a duality-compatible, two-scale filtration that collapses to one scale at the right endpoint. This filtration defines shell-uniform transition laws for hierarchical random walks on a discrete group whose scaling limits are Lévy processes on Q_p^2. The diffusion constants of the coordinate processes jump at the right endpoint, even though the radial jump law depends continuously on h. This instance of geometry-induced criticality isolates a structural mechanism that should extend to locally compact abelian groups and suggests a route to studying critical behavior in ultrametric models.

Keywords: Ultrametric diffusion, scaling limits, component processes, p-adic Brownian motion, criticality

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