Directed polymer in γ-stable Random Environments

Roberto Viveros

Instituto de Matematica Pura e Aplicada

Abstract:
The transition from a weak-disorder (diffusive phase) to a strong-disorder (localized phase) for directed polymers in a random environment is a well studied phenomenon. In the most common setup, it is established that the phase transition is trivial when the transversal dimension d equals 1 or 2 (the diffusive phase is reduced to $\beta = 0$) while when $d \geq 3$, there is a critical temperature $\beta_c \in (0, \infty)$ which delimits the two phases. The proof of the existence of a diffusive regime for $d \geq 3$ is based on a second moment method, and thus relies heavily on the assumption that the variable which encodes the disorder intensity (which in most of the mathematics literature assumes the form $e^{\beta\eta_x}$), has finite second moment. The aim of this work is to investigate how the presence/absence of phase transition may depend on the dimension d in the case when the disorder variable displays heavier tail. To this end we replace $e^{\beta\eta_x}$ by $(1 + \beta\omega_x)$ where ω_x is in the domain of attraction of a stable law with parameter $\gamma \in (1, 2)$.