Bangalore Probability Seminar

Title : Anomalous diffusion on the GFF landscape

Speaker : Subhajit Goswami, The Institut des Hautes Études Scientifiques, US

Date : Monday, July 22, 2019

Time : 1:45 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : Diffusion in a random potential with log-correlations is a model of great interest studied in different contexts in statistical mechanics, condensed matter physics and population biology among others. In two-dimension a canonical example of a log-correlated field is the Gaussian free field (GFF). In this talk I will present a family of random walk models on the square lattice indexed by an inverse temperature parameter where the the underlying transition probabilities are governed by a sample of the two-dimensional GFF with appropriate boundary conditions. The random walk jumps to a neighbour v with probability proportional to the exponential of the product of inverse temperature and field value at v. As such this is a model of random walk in random environment (RWRE) where the underlying environment is strongly correlated. It has been predicted in the physics literature that this walk is sub-diffusive and furthermore the diffusive exponent exhibits a dynamic phase transition around a certain critical temperature. I will discuss some rigorous results where we have been able to partially confirm these predictions including rigorous derivations of precise diffusive exponents at all temperatures. Based on a joint work with Marek Biskup and Jian Ding.