Seminar of Probability and Stochastic Process

Tuesday, 26th May, from 16h00 <u>MA B1 524</u>, EPFL, Ecublens

Prof. Pierre Tarrés

EPFL

Edge-reinforced random walk and supersymmetry

Abstract:

Edge-reinforced random walk (ERRW), introduced by Coppersmith and Diaconis in 1986, is a random process which takes values in the vertex set of a graph G, and is more likely to cross edges it has visited before. We show that it can be represented in terms of a Vertex-reinforced jump process (VRJP) with independent gamma conductances: the VRJP was conceived by Werner and first studied by Davis and Volkov (2002,2004), and is a continuous-time process favouring sites with more local time. Then we prove that the VRIP is a mixture of time-changed Markov jump processes and calculate the mixing measure, which we interpret as a marginal of the supersymmetric hyperbolic sigma model introduced by Disertori, Spencer and Zirnbauer (2010). This enables us to deduce that VRIP and ERRW are positive recurrent on graphs of bounded degree for large reinforcement, and that VRJP is transient in dimension greater than or equal to 3 for small reinforcment, using the previous results of Disertori and Spencer and Zirnbauer. (Joint work with Christophe Sabot)

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