Seminar of Probability and Stochastic Process

Monday, 11th April, from 14h15
MA 11, EPFL, Ecublens

Prof. Nils Berglund

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Regularity structures and renormalisation of FitzHugh-Nagumo SPDEs in three space dimensions

Abstract:

Abstract: Martin Hairer's recent theory of regularity structures allows to define a notion of solution for very singular stochastic PDEs, including (but not limited to) a large class of suitably renormalised parabolic SPDEs driven by space-time white noise. After providing an introduction to regularity structures, we will present an extension of the theory to systems of parabolic SPDEs coupled to an ODE, where the unknown is a function of time and two- or three-dimensional space. These equations include in particular a FitzHugh-Nagumo system describing the evolution of action potentials of a large population of neurons, as well as models with multidimensional gating variables. Our main result shows local existence of solutions to a renormalised version of the equations, with explicit expressions for the renormalisation constants. Joint work with Christian Kuehn (TU Vienna). Reference: Nils Berglund and Christian Kuehn, Regularity structures and renormalisation of FitzHugh-Nagumo SPDEs in three space dimensions, Electronic J. Probability 21 (18):1-48 (2016).

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