Séminaire de Probabilités et Statistique

Mardi 26 Novembre à 14h00

Laboratoire Dieudonné
Salle de réunion Fizeau - LJAD

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Statistical testing of the covariance matrix inmultidimensional neuronal models

Stochastic diffusions became a classical tool for describing a neuronal activity, ei-ther of a one single neuron (Ditlevsen and Samson, 2012, Höpfner et al., 2016, Leonand Samson, 2017), or a large network of neurons (Ditlevsen and Löcherbach, 2017,Ableidinger et al., 2017). However, the techniques which would allow us to establisha rigorous link between a specific model and available neurophysiological data is of-ten missing. The open question is the source of stochasticity in spiking activity.

One point of view is that both the membrane and the ion channels of the neuron cell areaffected by noise. Another position is that only the ion channels have a stochastic behaviour and that their concentration in cell explicitly defines the membrane poten-tial. The question is then how to test both hypotheses with extracellular recordingsof the membrane potential. For network-scale neuronal models, the estimation ofthe noise rank is equivalent to estimating a number of populations of different typesof neurons in the network. The question boils down to a problem of a covariancematrix rank estimation and constructing a statistical test of the rank. Our aim is tochallenge this problem with the help of numerical approximation methods for sto-chastic diffusions and properties of matrix determinants, following works of Jacodet al. (2008), Jacod and Podolskij (2013).