

Séminaire de Probabilités et Statistique

Jeudi 16 Mars 2023 à 14h00

Laboratoire Dieudonné

Guilherme Ost

Federal University of Rio de Janeiro.

Understanding interactions of biological neural networks via multivariate Hawkes-type processes.

Due to recent technological advances, recordings of the simultaneous activity of hundreds to thousands of neurons, at single cell resolution, are now abundant. These multi-unitary recordings are first pre-processed and then rearranged in a sequence of discrete events, each event corresponding to an action potential (often called spike). A central question in neuroscience is then to understand, from this sequence of spikes, how neurons in a large network interact with each other. In this talk, I will discuss some rigorous results related to this question. More specifically, I consider multivariate Hawkes-type processes as a model of biological neural networks. For this class of models, I will first present some results suggesting that the interaction between neurons cannot be of mean-field type (“uniform”) for most neural networks. Then, in the remaining part of the talk, I will present some statistical methods I have been developing in order to infer the interactions between the neurons in a given network.