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From individual neurons to neural networks: three different scales

The aim of this talk is to bridge two scales of neuronal modeling: point processes at a microscopic level and PDEs at a macroscopic level. The bridge is obtained via a mean-field limit and the limit PDE is a model previously studied by Pakdaman, Perthame and Salort. Furthermore, the study of the fluctuations associated with the mean-field limit gives some insights about a new stochastic PDE model which should correspond to the mesoscopic scale.