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joint work with

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Title : A stochastic Hodgkin-Huxley model with periodic input

Abstract :

We consider an extended stochastic Hodgkin-Huxley model for a spiking neuron including its dendritic input. The latter carries some deterministic periodic signal coded in its drift coefficient and is the only source of noise of the whole system. This amounts to a 5d SDE driven by 1d Brownian motion for which we can prove positive Harris recurrence.

This approach provides us with laws of large numbers which allow to describe the spiking activity of the neuron in the long run. This talk is based on our recent work [1], [2], [3].

References

[1] Höpfner, R., Löcherbach, E., Thieullen, M. Strongly degenerate time inhomogeneous SDEs: densities and support properties. Application to a Hodgkin-Huxley system with periodic input, Preprint arXiv:1410.0341

[2] Höpfner, R., Löcherbach, E., Thieullen, M. Ergodicity for a stochastic Hodgkin-Huxley model driven by Ornstein-Uhlenbeck type input, *to appear in* A. I. H. Poincaré, arXiv:1311.3458v3

[3] Höpfner, R., Löcherbach, E., Thieullen, M. Ergodicity and limit theorems for degenerate diffusions with time periodic drift. Application to a stochastic Hodgkin-Huxley model, In preparation.