
*Thursday, May 24th, 2012
14h15, Room BC01*

Computational Neuroscience Seminar

Tilo SCHWALGER,
Theory of Complex Systems and Neurophysics,
BCCN Berlin

Theory for neurons with non-renewal spike trains

Many neurons exhibit serial correlations between interspike intervals (ISIs) within their stationary spike trains. Sources of these correlations include intrinsic adaptation mechanisms and temporally-structured stimuli. Here, analytical formulas for the ISI statistics of such non-renewal spiking behavior are derived by using weak-noise approximation techniques. In particular, for tonically firing integrate-and-fire neurons with spike-frequency adaptation and different sources of noise analytical expression for the ISI density, the serial correlation coefficient as well as the membrane potential distribution are put forward. Furthermore, I calculate the ISI statistics for a neuron that is driven by a stimulus with an arbitrary correlation structure. These analytical results are then utilized to determine the dominant source of noise in auditory receptor cells of locusts and to explain the complex spike patterns of electrosensory afferents in paddlefish.