# Exact computation of the Maximum Entropy Potential from spiking neural networks models.

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**Abstract:** Neural populations encode information about stimuli and underlying synaptic architecture collectively through series of binary spatio-temporal patterns of action potentials, or "spike trains". Understanding how the stimuli and synaptic connectivity influence the statistics of these spike patterns is a central question in computational neuroscience. Maximum Entropy approach have been successfully used to characterize the statistical response of simultaneously recorded spiking neurons. Despite these models could achieve good performance in terms of prediction, the fitting parameters do not explain the underlying causes of the observed correlations. On the other hand mathematical models of spiking neurons do provide a probabilistic mapping between stimulus, network architecture and spike patterns in terms of conditional probabilities, although in a highly redundant way. In this talk i will propose an innovative approach to establish a deterministic and exact mapping between Maximum Entropy parameters and structural parameters (synaptic weights and external stimulus) defining a statistically equivalent spiking neural network model.