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**dHAN Model of a Neural Network in the Light of
Experimental Neuroscience**

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A model of dense homogeneous associative network (dHAN) of neurons has recently attracted attention due to its unique properties [1] [2]. This model shows several emerging features. It is able to recognize external patterns in noisy background, to focus attention autonomously and to represent hierarchical memory with an internal structure. We have studied various properties of this model in details. In particular, we have focused our attention on two different set of experiments in empirical neuroscience. On one hand, neural culture samples of cerebral cortex of wistar rat which has illustrated dependency of bursting frequency during synchronous firing on network connectivity [3] and on the other hand, an experiment on prefrontal and occipital cortex slices of ferret which has demonstrated a neural system showing collective oscillations that can be forced into an upstate by injecting a positive electric pulse. This state could afterward be terminated by a second pulse of identical polarity, but with specific dependency on pulse intensity and delay to the first one [4] [5]. Here, we present our results for the general properties of this model, and discuss in particular, its success in reproducing recent experimental results.

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- [1] C. Gros, *New J. Phys.* **9**, 109 (2007).
 - [2] T. Fukai, S. Tanaka, *Neural Comp.* **9**, 77-97 (1997).
 - [3] L.C. Jia, M. Sano, Pik-Yin Lai, C.K. Chan, *Phys. Rev. Lett.* **93**, 088101-1 (2004).
 - [4] Y. Shu, A. Hasenstaub, D. A. McCormic, *Nature* **423**, 288 (2003).
 - [5] H.-V. Ngo et al, *Europhysics Letters* **89**, 68002 (2010).