ΣΕΜΙΝΑΡΙΟ ΚΕΝΤΡΟΥ ΚΒΑΝΤΙΚΗΣ ΠΟΛΥΠΛΟΚΟΤΗΤΑΣ & ΝΑΝΟΤΕΧΝΟΛΟΓΙΑΣ/ CCQCN SEMINAR

Tuesday, 12 May 2015

12:30-13:30

3rd Floor Seminar Room

Do brain networks evolve by maximizing their information flow capacity?

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Abstract

In this talk I will present our working hypothesis supported by numerical simulations that brains evolve based on the principle of the maximization of their internal information flow capacity. We have found that synchronous behavior and capacity of information flow of the evolved networks reproduce well the same behaviors observed in the brain dynamical networks of *Caenorhabditis elegans* and humans, networks of Hindmarsh-Rose (HR) neurons with a graph given by these brains. I will then discuss on the verification of our hypothesis by showing that HR neural networks evolved with coupling strengths that maximize information flow capacity are those with the closest graph distance to the brain networks of *Caenorhabditis elegans* and humans. I will also demonstrate that global neural synchronization levels decrease during brain evolution, reflecting on an underlying global no Hebbian-like evolution process, which is driven by no Hebbian-like learning behaviors for some of the clusters during evolution, and Hebbian-like learning rules for clusters where neurons increase their synchronization. Finally, I will briefly talk about some of our recent results on neural coding in the presence of noise and its importance on the transmission of information in brains.