

## ΣΕΜΙΝΑΡΙΟ ΚΕΝΤΡΟΥ ΚΒΑΝΤΙΚΗΣ ΠΟΛΥΠΛΟΚΟΤΗΤΑΣ & NANOTEΧΝΟΛΟΓΙΑΣ/ CCQCN SEMINAR

**Tuesday, 12 January 2016**

**11:00-12:30**

**3<sup>rd</sup> Floor Seminar Room**

### **Self-organizing patterns in networks of active elements**

***Dr. Nikos E Kouvaris,***

*Complex Lab Barcelona, Department of Physics, University of Barcelona*

#### **Abstract**

Distributed active media are found in a wide range of natural systems including neural cells, heart tissue, surface chemical reactions, ecological and social systems, etc. They consist of coupled elements obeying an activator-inhibitor dynamics. Such media were broadly studied with continuous reaction-diffusion equations and support a variety of self-organized spatio-temporal patterns like Turing patterns, traveling fronts, synchronization, rotating spirals, etc.

Within the last decade, self-organization of patterns has been considered in networks, where reactions occur on the network's nodes and diffusion is carried out through the links connecting them. Such systems can be formed by diffusively coupled chemical reactors, biological cells or dispersal habitats. The rapid development in network science provides increasing insight into the impact of their topology upon the emerging collective dynamics. A variety of self-organizing phenomena has been studied in such complex systems including epidemic spreading, synchronization and chimera states, stationary Turing and self-organized oscillatory patterns, etc. Collective phenomena induced by feedback control or by noise have also been analyzed in networks.

In this talk we attempt to give a synopsis of the new mechanisms inducing and controlling self-organizing patterns in networks, focusing on systems originated from chemistry, neuroscience and ecology which we have been studying during recent years.

