Dynamic brain parameter profiling in schizophrenia

In order to study the dynamics of neurodegeneration in schizophrenia, we construct a model that bridges the basic and clinical ends into one picture. Animal cell recordings offer an indispensable mechanistic perspective: we follow closely a series of new experimental results on dopamine system responsiveness to construct a model based on network firing rates, consistent with the observed stability and kinetics. Clinically, we build a phenomenological model of the nonlinear dynamic brain connectivity, and we validate it by our fMRI results in healthy controls and schizophrenic patients.

We expect to find similarities in the organizational complexity at different anatomical and physiological levels of this layered central system. The brain, like most other live systems, is believed to function close to the boundary between order and chaos. It would be surprising if it didn't use the same entropy-minimizing tricks in more than one context. It is also plausible that schizophrenia and other similar conditions may represent a temporary or permanent escape towards/into the chaotic regime.

The talk will assume very basic knowledge of neurophysiology and dynamical systems, and should be reasonably easy to follow by everyone who is either interested in one of its three (neuroscience, imaging and mathematical) aspects – or who wants to face every academic's greatest fear of his/her own neurodegeneration.