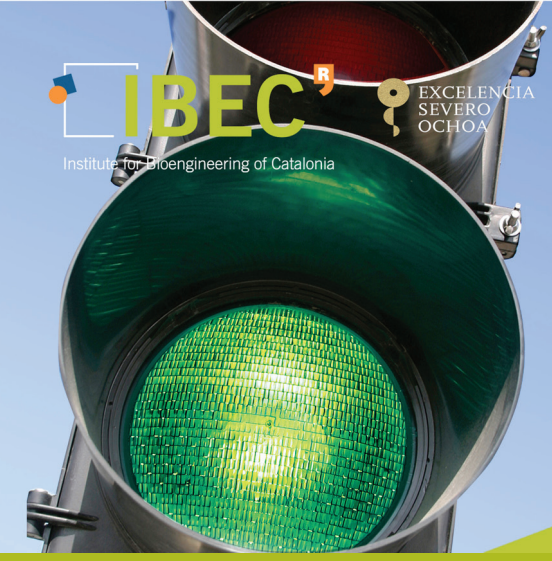

IBEC
Institute for Bioengineering of Catalonia

EXCELENCIA SEVERO OCHOA

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Data-driven analysis of coupled network models: What can they teach us about biomedical systems?

Mathematical models can have a simple definition but still show a very rich behavior. Often such models hold the key to understand complex real-world phenomena. Embedded in this context, we aim to study networks of coupled oscillator with the aim to reveal analogies between their dynamics and phenomena found in biomedical systems. This work will build upon a recent study of ours which discovered an intriguing analogy between the collapse of so-called chimera states in nonlocally coupled phase oscillators and epileptic seizures. (For more detailed information, we refer the interested candidate to http://www.nature.com/articles/srep23000). Accordingly, the project will involve the data-driven study of signals derived from the oscillator network models as well as biomedical data provided by clinical partners. The latter includes, but does not have to be limited to, electroencephalographic recordings from epilepsy patients. Both the implementation of the networks as well as the signal analysis is purely numerical. This thesis involves no laboratory or experimental work.