UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Theorie-Kolloquium SS 2024
Fr 21.06.2024, 14:00-15:30
MC 351 & online (URL in E-Mail)

udue.de/TheoKoll

Physics meets epilepsy

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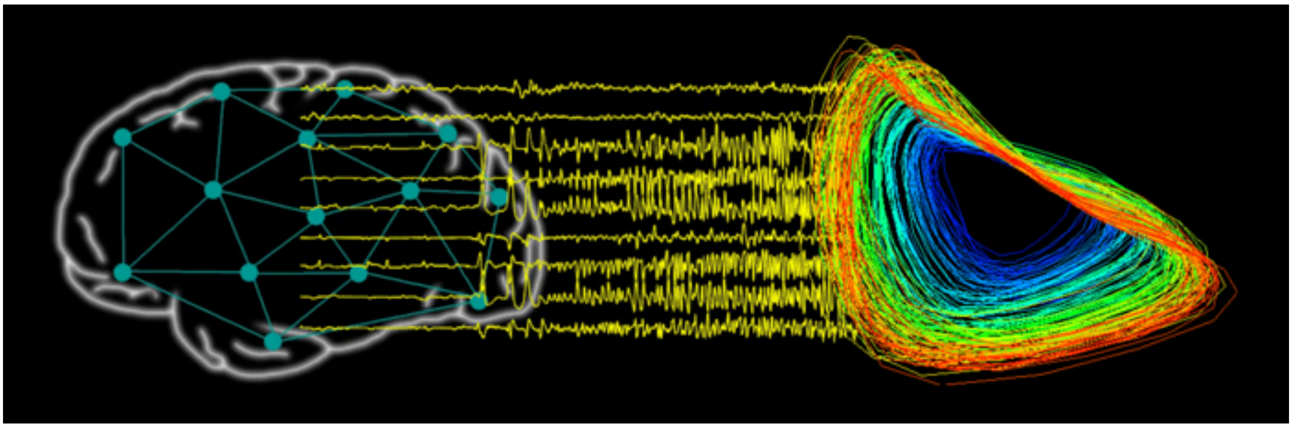

The human brain is an open, dissipative, and adaptive nonstationary dynamical system composed of a large number of interacting subsystems. Its complicated spatial–temporal dynamics is still poorly understood. Epilepsy is a chronic brain disease that affects approximately 50 million people worldwide. Epileptic seizures are the cardinal symptom of this multi-facetted disease and are usually characterized by an overly synchronized firing of neurons. Seizures cannot be controlled by any available therapy in about 25% of individuals. Although epilepsy is probably the oldest disease known to mankind, knowledge about mechanisms underlying generation, spread, and termination of the extreme event seizure in humans is still fragmentary. Over the last decades, an improved characterization of the spatial-temporal dynamics of the epileptic process could be achieved with concepts and methods from nonlinear dynamics, statistical physics, synchronization and network theory. I will provide an overview of the progress that has been made in the field: from preliminary descriptions of pre-seizure phenomena via implantable seizure prediction and prevention systems to recent developments that promise an advanced characterization of complex brain dynamics.