

Posluchárna M1, 14:00, 3. října 2023

Speaker: Hil Meijer

Title: Data-driven dynamical network models of brain activity in epilepsy patients

Abstract: For patients with refractory epilepsy, surgery may be a treatment option. While preparing for surgery, brain activity is recorded to delineate the tissue responsible for the seizure and to be resected. In this talk, we consider recordings from subdural grid electrodes with single pulse electrical stimulation (SPES). The responses to SPES consist of physiological early responses (ERs) and pathological delayed responses (DRs).

We start with constructing brain networks with several connectivity measures. We show that ER-based effective connectivity reveals more physiological connections than functional connectivity based on cross-correlation or Granger causality. We find that the epileptogenic zone is a densely connected subnetwork. Second, we model the SPES responses using neural mass models of mesoscopic brain activity. Using dynamical systems theory, we characterize a threshold for DRs to appear and their relevance as a clinical biomarker. Finally, we present preliminary results for fitting large-scale individualized patient networks based on SPES responses.