Lecture Hall **M1, 2:00 pm, Tuesday, 3 October, 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.