

Title: Oscillatory Dynamics in Mathematical Models of Neural Networks

Abstract: Oscillations are ubiquitous in the brain, but their role is not completely understood. This presentation will examine oscillations in neural networks using mean-field models, which allow for a precise description of a network's macroscopic activity and are amenable for mathematical analysis. By using techniques from dynamical systems and control theory, such as the parameterization method for invariant manifolds, we can thoroughly analyze the oscillatory dynamics and phase-locking patterns between groups of oscillating neurons. We will also discuss the impact of the resulting phase-locked states on neuronal communication, and how our findings can contribute to unveil the role of oscillations in certain cognitive tasks.