数学与系统科学研究院

计算数学所学术报告

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报告题目：

The space and time of neuronal variability in a spiking neuron network

邀请人： 毛士鹏 副研究员

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上午 10:00-11:00

报告地点： 科技综合楼三层

311 报告厅

Abstract:

Shared variability among neurons (noise correlations) have been commonly observed in multiple cortical areas (Cohen and Kohn, 2011). Moreover, noise correlations are modulated by cognitive factors, such as overall arousal, task engagement and attention (Cohen and Maunsell, 2009; Doiron et al. 2016). While there is much discussion about the consequences of noise correlations on neuronal coding, there is a general lack of understanding of the circuit mechanisms that generate and modulate shared variability in the brain. Recently, simultaneous microelectrode array recordings from V1 and MT in behaving monkeys (Ruff and Cohen, 2016) suggest that attention not only decreases correlations within a cortical area (MT), but also increases correlations between cortical areas (V1 and MT). The differential modulation of between-areas and within-area noise correlations impose further constraints on circuit mechanisms for the generation and propagation of noise correlations. We develop a spiking neuron network with spatiotemporal dynamics that internally generates shared variability matching the low dimensional structure widely reported across cortex. The low dimensional variability requires slow and narrow inhibition, which are consistent with physiology. We further show that the internally generated variability results from macroscopic chaos in population rates, which correlates neurons from the same recurrent network while decoupling them from feedforward inputs. Attention is modeled as depolarizing the inhibitory neuron population, which reduces the internally generated shared variability and allows the network to better track input signal. Our model provides a much needed mechanism for how shared variability is both generated and modulated in recurrent cortical networks.

欢迎大家参加！