



Sensory Processes: From Molecules to Cognition

April 12 - 13, 2016, Veranstaltungszentrum, Ruhr University Bochum

Wednesday April 13, morning (9:15 – 12:05)

Session 3 Neuronal Oscillations and Cellular Communication

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Multineuronal activity patterns and hippocampal network oscillations

Many lines of evidence indicate that neuronal representations are formed by groups of neurons which express reproducible spatiotemporal activity patterns. Such neuronal ensembles are formed by selected neurons within local networks which are activated together during specific cognitive-behavioral states. Coherent activity is often organized by network oscillations which define alternating phases of low or high firing probability, respectively.

Using oscillating hippocampal networks as an example, we will address several key questions regarding the formation and activation of neuronal ensembles: How are selected neurons bound into ensembles? How are the non-participating neurons suppressed during activation of an ensemble? How are the underlying network oscillations generated? Are ensembles plastic? How are local ensembles bound into large-scale functional systems in the brain?

The talk shall introduce some basic structural and functional concepts of neuronal networks, present experimental and theoretical research strategies, and show recent results which suggest some preliminary, specific answers to the questions raised above.

