

Colloquium

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Tuesday, 20. March 2012, 18:00 hours, GA 04/187

Host: Prof. Sen Cheng

Website: www.rub.de/cns

All interested students, scientists, and scholars are cordially invited to this talk of the IKN colloquium.

Encoding and reactivation of spatial memory traces by hippocampal cell assemblies

We recorded place cell activity in behaving rats during a matching-to-multiple-places task that requires frequent updating of memories for goal locations. The task took place on a cheeseboard maze where rats had to find a set of hidden rewards. The place-related firing patterns in CA1 region reorganised to over-represent the learned goal locations whereas such reorganisation did not take place in CA3. Moreover the learning-related CA1 population firing patterns representing learned locations predicted memory performances in subsequent memory retention tests. At the goal locations 200Hz high-frequency network oscillations, called sharp-wave/ripples (SWR) were observed. Place cells encoding goal locations increased their firing rate during these SWRs. Moreover, SWRs facilitated the synchronisation of place cells encoding the same goal locations, hence promoting the stabilisation of new place representations. During sleep period following learning, the firing patterns of goal-encoding cells exhibited stronger reactivation than other place cells and their reactivation predicted subsequent memory performances. Altogether, these results suggest that the reorganisation and reactivation of goal-related population firing patterns sustain spatial learning and memory retention abilities.