



## Introductory Remarks to Symposium 34

# The dentate gyrus – from microcircuit function to control of behavior

Marlene Bartos, Freiburg

The dentate gyrus (DG) is the entrance gate of the hippocampus and translates the rich input stream from the entorhinal cortex into sparse non-overlapping memories. The network mechanisms underlying sparse coding are however largely unknown. This symposium will bridge between recent *in vivo* and *in vitro* studies to highlight new insights on the role of the various components of the DG network, glutamatergic granule cells, mossy cells and GABAergic inhibitory interneurons, as well as their output synapses in the sparse coding of information and the spatio-temporal emergence of DG population activity during learning. It will focus on the question of ‘how the various cellular components may support the sparse orthogonal representation of information in the DG neuronal network on spatial and temporal scales’ by presenting recent *in vivo* investigations on activity patterns as well as the underlying synaptic inputs of glutamatergic granule cells, mossy cells and GABAergic interneuron types. Complementary information will be provided by 2-Photon imaging of single cells and populations of neurons in the DG of behaving mice. We will highlight recent studies on the functional role of newborn granule cells in sparse representations in the DG circuitry. The speakers utilize a breadth of advanced experimental techniques including whole-cell recordings in awake mice, 2-photon population imaging in behaving animals, optogenetics and quantitative behavioral analysis. Thus, with this symposium, we aim to improve our understanding on the synaptic, cellular, and network mechanisms underlying sparse activity in the DG and to provide new insights on the spatio-temporal representation of information on the level of single cells and cell assemblies during learning. With this symposium, we further aim to contribute to a better understanding on the function of this particular brain area, which received increasing interest in the recent past.

## Symposium 34

Saturday, March 23, 2019  
8:30 - 10:30, Lecture Hall 104

Chair: Marlene Bartos, Freiburg

- 08:30    **Opening Remarks**
- 08:40    Fritjof Helmchen, Zurich, Switzerland  
TWO-PHOTON IMAGING OF DENTATE  
GRANULE CELLS AND CA3 PYRAMIDAL  
CELLS IN MOUSE HIPPOCAMPUS (S34-1)
- 09:00    Heinz Beck, Bonn  
MECHANISMS OF SPARSE CODING IN THE  
DENTATE GYRUS (S34-2)
- 09:20    Christoph Schmidt-Hieber, Paris, France  
PROBING CELLULAR MECHANISMS OF  
PATTERN SEPARATION IN THE DENTATE GYRUS  
(S34-3)
- 09:40    Marlene Bartos, Freiburg  
IN VIVO IMAGING OF STABLE AND DYNAMIC  
MEMORY ENGRAMS IN THE RODENT HIPPO-  
CAMPUS (S34-4)
- 10:00    Thomas Hainmüller, Freiburg  
IMAGING THE DENTATE GYRUS CIRCUITRY  
DURING VIRTUAL NAVIGATION (S34-5)
- 10:20    **Concluding Remarks**