

# Neuroscience Colloquium Winter Semester 2010/2011

**Chris McBain**

Eunice Kennedy Shriver National Institute of Child Health and Human  
Development, Bethesda, MD, USA

## Development and Function of a Hippocampal Feedforward Inhibitory Circuit

Information processing within cortical circuits requires a high degree of precision in the timing and extent of action potential generation amongst excitatory glutamatergic principal neuron ensembles. Such coordination of principal cell activity is orchestrated to a large degree by a relatively small number of local circuit GABAergic inhibitory interneurons. Though few in number, representing roughly 25% of all cortical neurons, these inhibitory elements comprise a highly heterogeneous cell population with distinct molecular, morphological, and electrophysiological properties. This remarkable diversity endows interneuron networks with the ability to provide exquisite spatiotemporal control over principal cell activity to regulate information flow within and between established cortical circuits. Moreover, specific subtypes of interneurons are implicated in regulating neuronal proliferation and migration during corticogenesis as well as postnatal maturation of cortical circuitry. Indeed several developmentally regulated neurological disorders such as epilepsy, schizophrenia and autism are associated with deficits in the numbers and function of distinct interneuron cohorts. Thus, a thorough appreciation of interneuron diversity is critical to understanding cortical network development, function, and disease. Here I will discuss recent data from my lab exploring the development and functional role of the dentate gyrus mossy fiber-CA3 feedforward inhibitory pathway. Our data suggest that rather than function as a canonical feedforward pathway similar to those describe elsewhere in the hippocampus and cortex the unique architecture of the mossy fiber-CA3 region establishes a novel form of temporally balanced synaptic input together with several novel forms of synaptic plasticity.

**Location:** BCCN lecture theater,  
Bernstein Center for Computational Neuroscience  
Humboldt-Universität zu Berlin  
Philippstr. 13, Haus 6

**Date:** Friday, December 3<sup>rd</sup>, 4:00 p.m.

**Host:** Jörg Geiger

Supported by:

**SFB 665** "Developmental Disturbances in the Nervous System"  
**GRK 1123** "Cellular Mechanisms of Learning and Memory Consolidation in the Hippocampal Formation"  
**SFB-TRR 43** "The brain as a target of inflammatory processes"  
**NeuroCure**

Organized by the Christian Rosenmund and Stephan Sigrist labs  
Contact: [christine.quentin@charite.de](mailto:christine.quentin@charite.de), [ari.liebkowsky@charite.de](mailto:ari.liebkowsky@charite.de)