RUB

SFB-COLLOQUIUM

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IGSN Seminar room FNO 01/117

Cortical circuit dynamics illuminated with genetically encoded voltage indicators

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Abstract:

Genetically encoded calcium and voltage indicators (GECIs and GEVIs) address the two main obstacles that brain sciences must overcome to bridge cellular level and systems physiology. The first difficulty arises from the fact that neuronal circuits generate and process signals through microscopically small and numerous parallel channels at the millisecond timescale. Optical activity indicators enable accurate detection of these signals with the required spatial and temporal resolution. The second obstacle is to overcome neuronal diversity. By genetically targeting defined populations of neurons, identification, monitoring and control of specific cell classes in their functional context becomes feasible.

Our lab engaged over the last 15 years in the development of genetically encoded voltage indicators based on the use of isolated voltage-sensing domains derived from voltage-sensitive membrane proteins, with fluorescent proteins providing readout of their voltage-dependent conformational state. This class of GEVIs has been given the acronym VSFP (voltage sensitive fluorescent protein). More recently, we demonstrated the principles of GEVI-based in vivo circuit imaging of very large pools of genetically specified classes of neurons, resolving their synchronized and coordinated activities. We believe that GEVI-based in vivo imaging technologies are sufficiently developed to approach many circuit level research questions in behaving rodent models. Examples will be presented to support this notion.

Host: Dirk Jancke (Optical Imaging Lab, RUB)

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