Distinguished Lecture in Biological Engineering

“fMRI in Rodents – from Bold Activity Readouts to Large Scale Networks Interactions”

Monday – January 30, 2017 – 12h15
EPFL – room SV1717

Prof. Markus Rudin
Institute for Biomedical Engineering, University of Zurich / ETH Zurich
& Institute of Pharmacology and Toxicology, University of Zurich (CH)

host: Prof. Dimitri Van De Ville

Abstract:

Functional magnetic resonance imaging (fMRI) in rodents is attractive in many regards. Mechanistic information on the link of the hemodynamic response to the underlying neural activity can be obtained by combining fMRI with established invasive readouts of neuronal function. Use of genetically engineered mouse lines allows assessing the impact of specific molecular entities involved in signal processing. The relatively simple (cortical) morphology enables detailed analyses of the functional topology and its rearrangements following CNS injury and full three-dimensional brain coverage the identification of large scale networks involved in a specific task, during pharmacological activation or at rest.

Challenges in rodent fMRI are linked to the small dimensions and corresponding high demands on spatial resolution, to the animal physiology, which should be stable enough to allow for detection of percent changes in signal intensity, and to the potential interference by anesthesia. Technical solutions are available and rodent (mouse) fMRI is becoming a commodity.

Different aspects of rodent fMRI will be addressed: 1) Mechanistic information on the neurovascular coupling obtained by combined fMRI with complementary activity readouts, 2) structural and functional connectivity in mouse brain, 3) dynamic aspects of functional connectivity, 4) investigation neurotransmitter networks using optogenetic approaches, and 5) analysis of the impact of pathological conditions such as cerebral amyloidosis mimicking aspects of Alzheimer’s disease, chronic psychosocial stress (CPS), and early life stress on brain functional networks.

Sandwiches will be provided

See current Bioengineering seminar calendar at http://bioengineering.epfl.ch/seminars