# Joint SDC/CFIN/DANDRITE talks

## NeuroCampus Aarhus

**7 August 2018**

**9:00 - 11:00**

**Auditorium 6, room 1170-347,**
**Department of Biomedicine**
**Aarhus University, Ole Worms Allé**

## Quantal transmission at single central synapses displays large variation in size with subunit

Jianyuan Sun, PhD, Professor

**Abstract**:
In the seminal work, Katz and colleagues established the quantal nature of synaptic transmission, whereby the basic unit of neurotransmission is the quantal event detected postsynaptically as a small all-or-none similar sized miniature postsynaptic potential or current (mini), in response to the neurotransmitter release from a single vesicle. However, the quantal nature of minis has never been justified by the study at single synapses, leaving the open question whether minis are identical in size and follow the principle of invariance. Here, we selectively study the quantal transmission from single active zone contained synapses using whole-cell recording and quantitative analysis. It was found that the amplitude of spontaneous and evoked miniature events from single synapses displayed large variation and were integer multiples of a subunit. Our study suggests the large encoding scope of quantal synaptic transmission and the higher capacity of synaptic information processing than that the quantal theory implied.

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## Neural circuit mechanisms for auditory-based perceptual decision-making

Ninglong Xu, PhD, Professor

**Abstract**:
Decision-making consists of discrete sub-processes rather than a unitary process. We study the neural circuit mechanisms of distinct sub-processes, including sensory to category transformation, categorical decisions, and action planning. We use mouse auditory decision behavior, combined with *in vivo* functional imaging and circuit perturbations to investigate these issues. First, we use *in vivo* two-photon calcium imaging from mouse primary auditory cortex to examine the computational mechanism of how the brain transform continuous sensory information into discrete categories. We observed task-dependent dynamic recruitment of local neuronal ensembles, which sharpens the categorization boundary via selective amplification. At population level, we found that perceptual categorization is strongly encoded by local population activity. Second, we investigate how the posterior parietal association cortex (PPC) contribute to categorical decision-making for novel sensory stimuli. We found that PPC neurons in mice exhibit population dynamics characteristic of category learning, adaptively incorporating new sensory information into established categories while maintaining stable representations for learned categories. Photoinhibition of PPC revealed a causal contribution of PPC to categorical decisions on new sensory stimuli, but not for well-experienced stimuli. Third, we identified a critical role of the connectivity between motor cortex and superior colliculus during sensory-guided motor planning, revealing a distributed circuit mechanisms for action planning during perceptual decision-making.

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**ALL ARE WELCOME**

If you would like to meet the Chinese Professors after their talks, please contact Kim Ryun Drasbek:
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