OIST SEMINAR

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DATE: **Tuesday, April 3rd, 2018**
TIME: **10:00 – 11:00**
VENUE: **B503 Seminar Room, Level B, Lab 1**

Circuit mapping with novel molecular genetic tools

Abstract:

Mammalian brain is composed of vast numbers of intricately interconnected neurons with various molecular, anatomical and physiological identities. To understand the roles of these individual building blocks, it will be critical to develop spatio-temporally precise tools that will allow neuronal subtype specific single cell level analysis. In our projects, we developed molecular tools that allow high throughput Cre line defined mesoscale monosynaptic circuit mapping. We also generated a pipeline that allowed us to perform ISI guided functional mapping of the visual areas followed by monosynaptic circuit mapping to locate inputs to Cre defined neurons of the neocortex. The process involves automated serial section 2P imaging followed by histology, segmentation, identification of postsynaptic as well as presynaptic neurons that are marked by nuclear histone tagged fluorescent reporter proteins, blood vessel mapping for ISI overlay and finally analysis of the input patterns with normalization to the number of postsynaptic neurons. In a parallel effort we developed novel light inducible genomic modification techniques to allow precise connectivity mapping and generated whole brain reconstructions of single neurons. We are also developing systems for applications to functionally and morphologically characterize cell type specific circuits within the mammalian brain in combination with single cell rabies tracing experiments. Another endeavor that we are pushing forward is to generate cell type specific viral vectors for connectivity mapping in cultured live human neocortical tissues that are normally discarded in patients undergoing brain surgeries. We hope that our results will set the foundation for large scale detailed analysis of cell type specific functional and anatomical circuits that will hopefully make it possible to link genetic identity, morphology, connectivity and function.

Please contact Prof. Kuhn (bkuhn@oist.jp) if you are interested in meeting the speaker.