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X-ray tomography for Circuit Neuroscience - Towards X-ray Connectomics

Wednesday 28 August 2024 08:30 (45 minutes)

The brain is one of the most complex structures known. In order to understand how information is processed in mammalian brains, one needs to combine functional measurements with structural information across scales from cm to nm. In this talk, I will discuss our multi-modal, multiscale approaches, combining functional imaging in vivo in mice with different synchrotron X-ray tomography techniques[1,2]. I will illustrate how nano-holotomography can reveal circuit structure at scale, sufficient to describe input-output relationships in a brain area. Moreover, advanced sample preparation approaches[3,4] make it possible to not only prepare samples optimised for X-ray tomography but also to subsequently perform targeted volume electron microscopy with multiple samples. I will conclude by providing an outlook on what the key challenges are for X-ray tomography to delineate neural circuitry at microscopic level[5] and how to scale these approaches up to entire brains.

References

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